owa CONSERVATIONIST

June 1992

Department of Natural Resources

CONTENTS

JUNE 1992

VOLUME 51, NO. 5

Iowa Conservationist (ISSN 0021-0471) is published monthly by the Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa 50319-0034. Second class postage paid in Des Moines, Iowa, and additional mailing offices. **Subscription rates: $6 for one year.** Include mailing label for renewals and address changes. POSTMASTER: Send changes to the *Iowa Conservationist*, Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa 50319-0034.

page 8

page 25

FEATURES

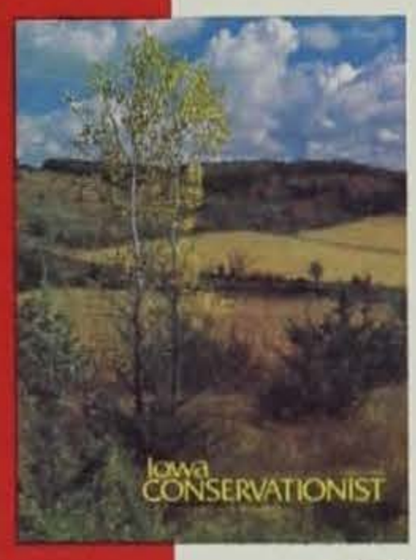
DEPARTMENTS

COVERS:

Front: Juvenile great horned owl by Roger A. Hill.
Back: Ruddy duck by Lowell Washburn.

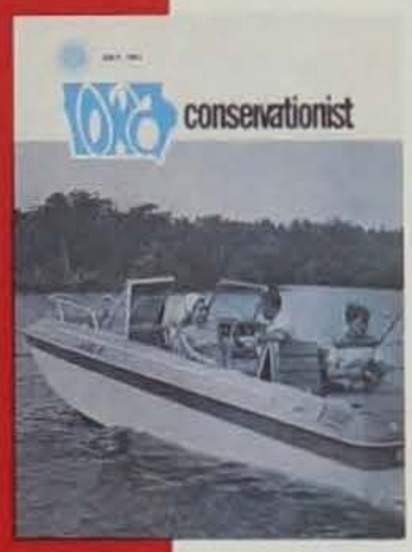
EDITORIAL

1992



1986

1974



1971

1970

1962

1942

Dear *Iowa Conservationist* Readers:

Over the years, the *Iowa Conservationist* has undergone its share of changes. Starting as a simple eight-page, black and white publication in the 1940s, it has evolved to the 32-page, full-color magazine it is today. Beginning with its next issue, the *Iowa Conservationist* will continue its evolution as it embarks on another change.

In July, the magazine will double in size -- go to 64 pages -- and will change to a bimonthly schedule. You will still receive the same number of pages per year of the *Conservationist*, in six issues, rather than 12. We will continue to publish our popular calendar issue, our spring fishing forecast, and fall hunting season outlook, as well as the same array of quality natural resource and environmental articles and photos to illustrate them. However, with our new format, we will be able to cover, with more depth, some of the more critical natural resource issues affecting Iowans. We will be able to bring you bigger pictures of Iowa's great outdoors and people enjoying them.

The *Iowa Conservationist* is not immune to the pressures on the state budget. In recent years, about half the cost of publishing the magazine has come from subscription fees, the other half from the DNR budget. As we all tighten our belts in tough economic times, so does the *Iowa Conservationist*. We are striving to become a financially self-sufficient magazine during this decade, requiring no support by tax dollars. By going to a bimonthly publication schedule, we will make considerable savings in printing and postage. And, since it has been six years since the last subscription rate change, an increase in prices is likely in the near future.

For more than 50 years the *Iowa Conservationist* has been bringing its readers valuable information, beautiful photos and quality entertainment. We promise to continue this tradition, and look forward to your continued support.

Sincerely,

Julie Sparks

Julie Sparks, editor

Raindrops Keep Falling...

by Kimberly K. Coulter

Ron Johnson

. . . the sky turns dark gray and in a matter of seconds the sprinkling turns into a downpour. Water rushes over the saturated ground, diving towards any available outlet. The water, spilling from small puddles, rushes through any available drainage outlet to run towards a larger body of water. Eventually it might reach a river, lake or ocean.

Through natural or artificial conveyances, the runoff is channeled and transported by gravity through a wide variety of drainage systems. Once in these systems, the runoff may scour accumulated pollutants out of gutters, basins, storm sewers, and drainage channels, eventually threatening the environment down stream.

There are many potential sources of pollution in storm water runoff, including automobiles, industrial processes, erosion from construction sites, pesticides, lawn fertilizers, pet wastes and illegal sewer taps into storm drains.

Automobiles which use leaded gasoline can pollute storm water from the airborne lead in

Ron Johnson

◄▲

Storm drains carry water that runs off lawns and streets. During an average rainfall, runoff rushes into the storm drain at a rate of five gallons per minute, flushing pollutants through storm sewers directly into lakes and streams.

automobile emissions that settles to the earth and washes into storm drains. Automobiles also drip grease and oil onto streets, highways and parking lots. The application of salt to highways during Iowa winters, creates further difficulties.

Construction sites can contribute a tremendous amount of sediment to storm water runoff. The erosion rate at these sites may be 10 times that of crop land. Also, chemicals like arsenic and copper, found in preservatives of treated wood used in home construction, can be carried by runoff.

Storm water from urban and residential areas can contain lawn fertilizers and pesticides, and organic material such as pet wastes and leaves which add nitrogen, phosphorus and other nutrients, as well as disease-carrying bacteria. Sometimes, oil, paints and household cleaners are also dumped into storm drains or on streets.

Runoff from shopping centers with large roofs and parking areas is heavily polluted with metals and other contaminants from automobiles, roofing tar and general corrosion. These contaminants are dissolved in the water but eventually attach themselves to suspended solids such as clay, dust and organic material.

Ash and other particles emitted by smokestacks also introduce pollutants into rainfall runoff. Either runoff or air currents carry these substances into bodies of water.

Weather and precipitation patterns impact the effects of runoff, as well. Long dry periods between storms allow greater quantities of pollutants to accumulate on the ground. This means that runoff will contain higher amounts of pollutants when storms eventually occur. The quantity and velocity of rain and storm water flow will determine how hard the runoff will scour surfaces and water channels. The U.S. Environmental Protection Agency (EPA) has estimated that approximately 90 percent of the particles on a street will be washed away by a one-half-inch rainfall.

Impacts

High levels of pollutants can negatively affect aquatic life in streams and lakes, either by direct death, impairments or a build up of toxic substances in the tissues of aquatic organisms.

According to John Olson, environmental specialist for the DNR, during storm water runoff, pollutants can reach high levels, resulting in death of fish and other aquatic life. "This type of fish kill, however, has been rare in Iowa,"said Olson. "More often, such nutrients contribute to the growth of algae and other aquatic plants. If this growth becomes exessive, oxygen depletion can occur, thus harming aquatic life."

Low levels of toxic metals and organic compounds can also have harmful effects such as limiting growth and reproduction of the aquatic community. "Aquatic organisms, including fish, can accumulate contaminants delivered through runoff," said Olson. Bioaccumulation occurs when organisms take in toxic substances present in water or sediments and store these substances in their body tissues at levels greater than those seen in water or sediments.

Fish can bioaccumulate chlordane (an insecticide formerly used for termite control) and polychlorinated biphenyls (PCBs), both suspected human carcinogens, at levels high enough to present a health risk to people who routinely consume contaminated fish over a lifetime. For example, channel catfish are primarily bottom feeders and are exposed to contaminants present in sediment. Their tissues contain a relatively high percentage of fat which allows them to accumulate fat-soluble contaminants, such as chlordane, at higher levels than other sport fish such as bass or walleye. Common contaminants of fish, such as chlordane, typically occur at very low levels in water and sediments and often cannot be detected. Since fish have a tendency to bioaccumulate these contaminants, it provides scientists a means for monitoring contaminant levels in the aquatic environment.

In 1988, the EPA canceled registration of all products containing chlordane, and banned the production of these products. In Iowa, the sale or use of chlordane was banned after January 1, 1989. The production of PCBs in the U.S. was terminated in 1977. Both chlordane and PCBs were used primarily on urban/industrial areas.

▼
Lack of proper grading and stabilizing measures at construction sites can lead to erosion. Runoff from these areas can be a major source of sediment pollution.

Ken Formanek

Iowa Concerns

In 1989 the DNR, in cooperation with the EPA, analyzed channel catfish in Easter Lake, an urban watershed lake within the Des Moines city limits, for toxic contaminants. The study showed that chlordane levels were high, 230 ppb (parts per billion), but below the U.S. Food and Drug Administration's recommend level of 300 ppb.

A follow-up study in 1990, conducted by the University Hygienic Laboratory, showed that water quality of Easter Lake was generally good and lake sediments did not contain detectable levels of contaminants (including chlordane) commonly found in Iowa fish. The next sampling of fish from Easter Lake is scheduled for 1993.

Control Practices

Control of storm water runoff can reduce its impacts. The method selected should be based on runoff flow and possible pollutants. Unfortunately, many current development practices designed to improve local drainage, such as curb and gutter systems or paving natural drainage channels, result in

increased runoff concentrations.

Detention basins can help reduce the flow rate to receiving waters, but they do not reduce total volume. In some places, poorly planned detention facilities have actually increased downstream flooding.

Drainage ways, lake shorelines and stream banks can be stabilized with riprap. Forested areas, wetlands or native vegetation can be used as buffer strips along banks and water ways to reduce runoff velocity and volume, allowing some to soak into the ground.

City street sweeping should include large commercial parking lots, thus reducing litter and toxic contaminants scoured by storm water runoff.

In winter months, the runoff from streets and highways in Iowa will not only contain oil and grease residues from traffic but also de-icing agents and sand. Although Iowa has not yet set requirements for handling of such chemicals, the Iowa Department of Transportation (DOT) keeps all of its sodium chloride or salt in covered buildings. The DOT also uses calcium chloride, which is added to the sand piles to prevent them from freezing. The calcium chloride is stored in buildings or under tarps. The DOT is presently investigating methods of protecting the sand, mixed with the de-icing agent, from runoff.

Devices can be installed at runoff sources to increase the percolation of water into soil and thus decrease overland runoff volume. For example, down spouts can direct roof drainage to lawns, porous pavements, holding trenches or basins and grass filter strips. Trenches and basins are most common because they can serve nearly every land use situation and can be incorporated into landscaped sites of all types. They not only reduce storm water runoff volume, they also reduce the contaminants discharged to receiving waters.

Porous pavements are 'hard' surfaces that can support a certain amount of activity while still allowing water to pass through. Special porous asphalt and concrete grids or lattice blocks are a few types that work even in areas with severe winters. They are generally used in low traffic areas, such as service roads, storage areas, and low-use sidewalks and parking lots. Care must be taken to protect against groundwater contamination.

Grass filter strips or waterways cost very little when incorporated into a landscaping plan. Filtering and increased infiltration reduce the sediment load in runoff from landscaped areas.

Water quality assessments conducted in the late 1980s have shown that sources of urban runoff pollutants are impairing water quality of rivers, lakes and streams throughout the U.S. An EPA document, *National Water Quality Inventory, 1988 Report to Congress*, reports that runoff pollution from urban areas and industrial sites is a leading cause of water quality impairment in 37 states. However, much of this runoff is discharged through separated storm sewers or other conveyances which are now subject to regulation.

Storm Water Control Program

The federal Water Pollution Control Act of 1972 required that permits be issued for municipalities and industrial sources of discharge. "While the permit program has progressed over the years," said Monica Wnuk, storm water specialist for the DNR, "the establishment of a comprehensive regulatory permitting

▼ ▶ **Urban runoff is a major contributor to water pollution. Activities associated with road use are one source of these contaminants. Diversion of rain from paved surfaces onto grassy areas will permit gradual absorption and avoid flowing directly into waterways.**

John Olson

John Olson

program for storm water discharges was delayed until the 1987 Clean Water Act amendments."

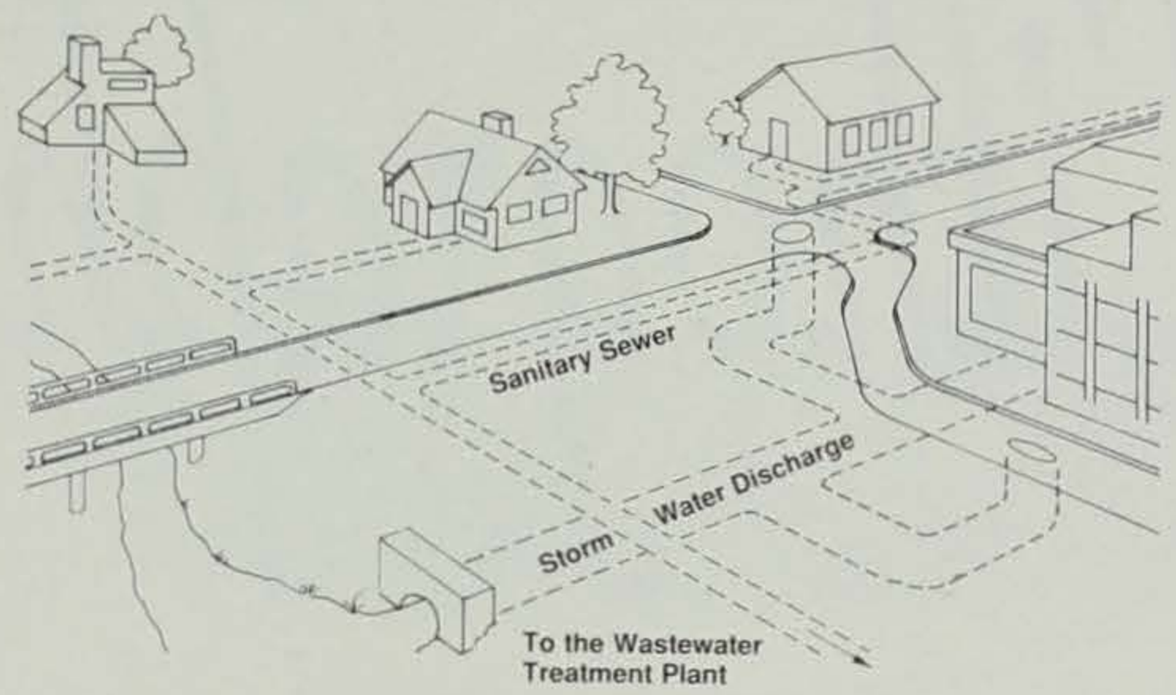
The EPA's new regulations require permits for storm water discharges from specific types of industrial activities. These permits must be applied for by October 1, 1992. In Iowa, the DNR administers this waste water discharge permit program for the EPA, also known as the National Pollution Discharge Elimination System (NPDES) permit program. "The DNR is estimating that between 2,000 and 7,000 industrial facilities will need to comply with the federal storm water permit requirements," Wnuk said. In addition the municipality storm sewers of Cedar Rapids, Davenport and Des Moines will also require NPDES permits.

Rules have been proposed to simplify the permitting process. The proposed rules introduce the use of a general permit for storm water discharges. This permit serves as a generic permit where all the terms and conditions of the permit are known prior to application. It also identifies who is eligible to apply for the permit.

Communities wishing to develop storm water management plans should consider these three main elements: define the existing or anticipated receiving-water problems caused by runoff; determine the sources of problem pollutants and the flows that cause the problems; and identify and evaluate control options. However, all of these management practices can work only with the cooperation of state, city and local governments. Efforts to reduce pollutants, begins with public awareness.

Kimberly K. Coulter is an information specialist working with the department's nonpoint source pollution program.

Urban Storm Drain and Sewer Systems



In most urban areas, storm drains carry runoff from many points of origin to receiving waters. In heavily developed commercial and residential areas, drains are usually enclosed, with branches running beneath the street surface. These branches accept storm water from the streets above and discharge the flow through a common drain outlet.

What Can You Do?

- Take used motor oil to a licensed recycler.
- Do not wash paints, thinners and other chemicals into the street. Take leftover paints, thinners and other chemicals to a household hazardous waste collection center.
- Maintain your car engine on a regular basis to minimize leaks.
- Keep the street in front of your house or business clean. Place clean-up debris in the garbage can with the lid securely fastened.
- Plant drought-resistant plants and water your lawn and garden sparingly.
- Substitute organic gardening methods for chemicals.
- Practice backyard composting of leaf and grass clippings.
- Avoid or reduce the use of your garbage disposal, because it contributes unnecessary solids to your waste water.
- When developing property, keep as much green, open space as possible. Plant plenty of trees and shrubs.
- Carefully apply lawn chemicals and limit the amount of fertilizers and pesticides being used. More is not better.
- Follow these "best management" practices: peg sod in place where water flows fast; terrace sloping hills to control runoff; mulch bare soil to absorb the energy of raindrops, saving seeds and soil; use fabric barrier fences to catch and hold sediment during construction; divert your roof down spouts and gutters to grass areas instead of pavement to reduce runoff.
- Use porous asphalt or concrete grid pavements as an alternative to poured concrete surfaces.
- Use ground cover instead of grass. Living plants and fabric materials work better than some grass lawns which can be as impervious as some pavement.

Conditions vary and, thus, site-specific factors must always be considered in evaluating your particular urban runoff sources and management practices.

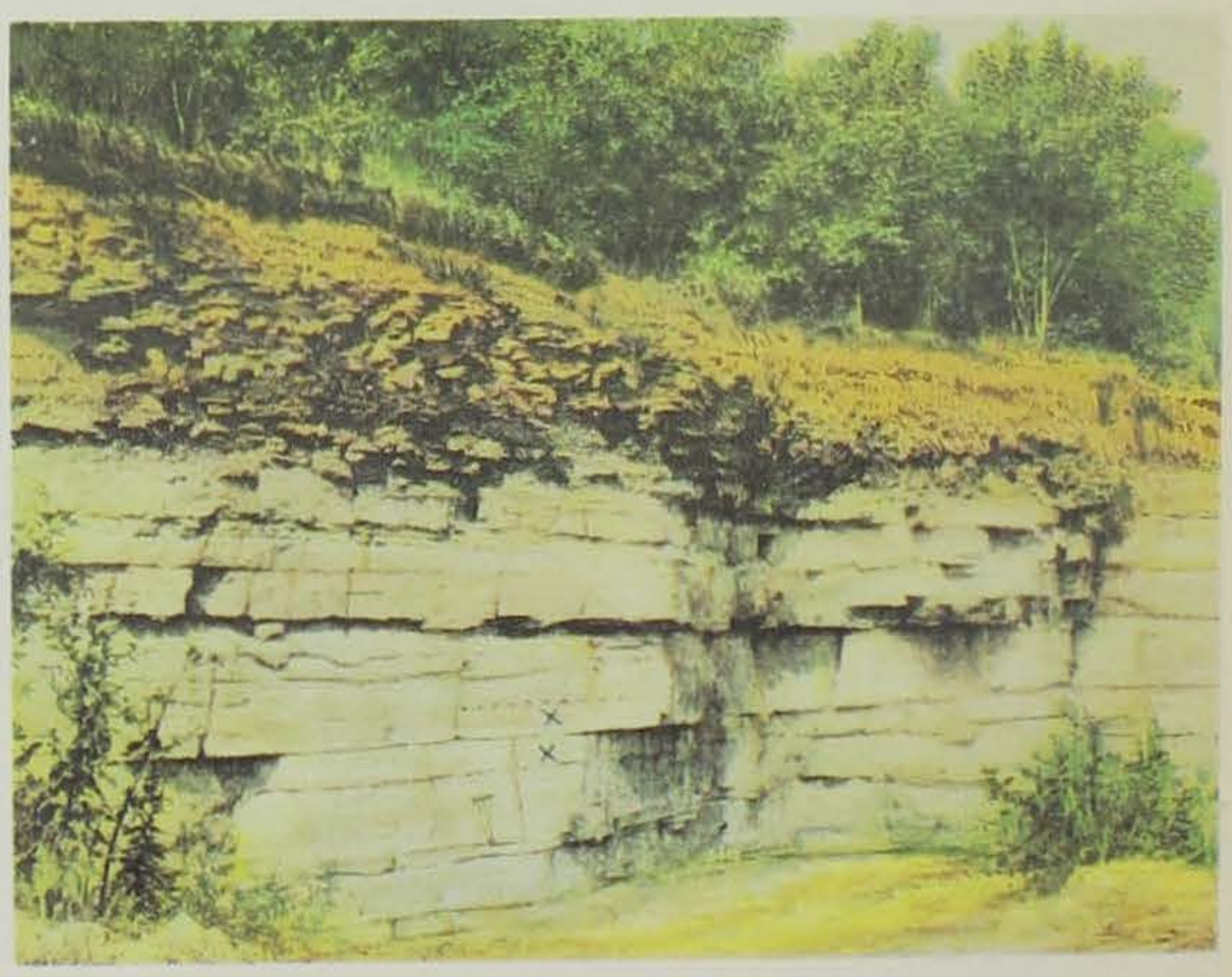
Lithograph City

by Bill J. Bunker

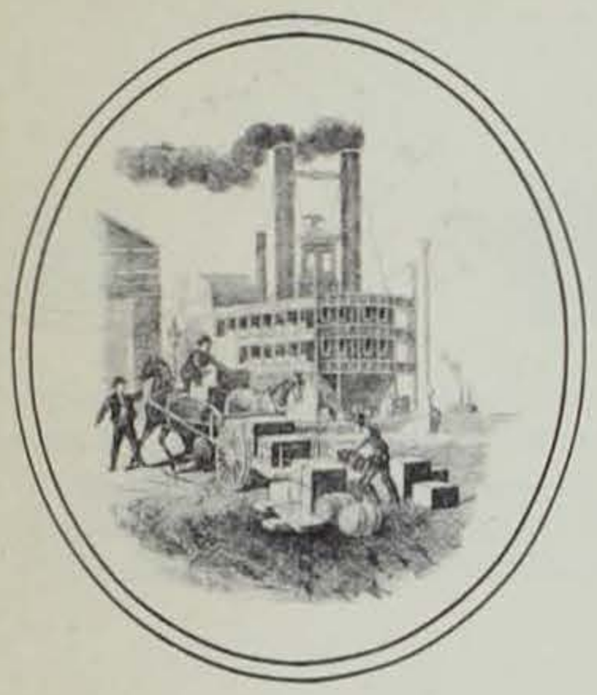
Before printed books, certain aspects of culture such as history, laws and church liturgy were preserved only by memory. The first manuscripts were hand-written on papyrus sheets which were glued together and rolled up. The rise of mechanical printing techniques involved blocks of wood, raised type molded of metal, or images engraved into wood or metal. With the advent of movable type and the production of bound pages, the written word has become more accessible to the general population.

Near the end of the 18th century, the technique of lithography was invented by a young Bavarian playwright, Aloys Senefelder, who sought an inexpensive means of reproducing his scripts. He found that text could be reproduced from smooth slabs of dense, fine-grained limestone inked with a preparation of wax, soap, lampblack and water. Lithography, as this process came to be known, is derived from the Greek words for "stone" and "writing." It is based on the concept that grease and water will not mix, and the greasy inks will adhere to an already greased surface while unmarked areas will remain clean provided the stone is kept damp during the operation.

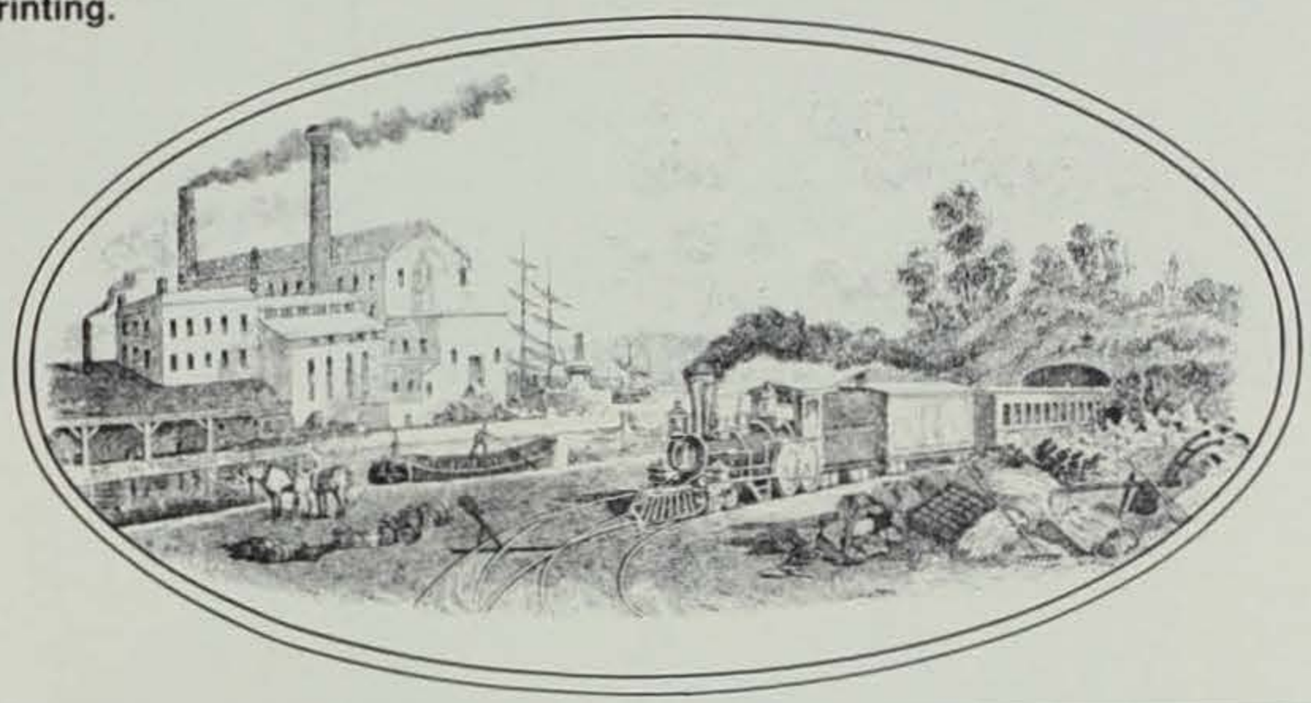
Many types of limestone have been used in lithography, but the world's best lithographic stone has traditionally come from quarries near the town of Solnhofen in the Jura Mountains of Bavaria (Germany), where the Senefelder family lived. These deposits of Jurassic-age limestone are superior because their fine granularity and chemical purity produce stable and consistent reac-



Lewis Quarry, southwest of Osage, Mitchell County, Iowa.
xx Beds of fine grained lithographic stone.



The illustration below and the oval illustrations at left appeared on a variety of certificates engraved by the American Lithographic and Printing Company of Des Moines on lithographic limestone quarried at Lithograph City in Floyd County. They were published as a series of plates in Clement Webster's 1915 issue of *Contributions to Science* to illustrate the quality of this Iowa stone for printing.



tions in the process of drawing and printing. Vast quantities of these stones, cut and prepared in a variety of sizes, were shipped to the United States during the 19th century for use in commercial lithography.

At the turn of the 20th century, a town in north-central Iowa was founded because of this interest in high-quality lithographic stone. Sedimentary rocks in this part of Iowa include compact, laminated, lithographic limestones which were deposited during Devonian time (about 370 million years ago) as limey muds in shallow tidal-flat environments associated with cycles of worldwide lowering of sea level. These limestones are exposed along the Cedar River valley near the Floyd-Mitchell county line, and in 1914 they prompted Clement Webster, an enterprising citizen of Marble Rock, to establish a settlement called Lithograph City. Here the limestone was quarried and marketed to compete with the more expensive, imported Bavarian stone.

In the 1903 *Annual Report of the Iowa Geological Survey*, Samuel Calvin noted that samples of Iowa's lithographic stone were submitted for testing to the lithographing house of A. B. Hoen & Company of Baltimore, Maryland. Hoen's "Discussion of Requisite Qualities of Lithographic Limestone, with Report

Gable Quarry, southwest of Osage, Mitchell County, Iowa.
xx Beds of fine grained lithographic stone.

Men with pry bars and horse-drawn skids for hauling stone work the layers of lithographic limestone at Quarry No. 1 in Lithograph City near the Floyd-Mitchell county line about 1914.

Rough slabs of quarried lithographic stone sit outside the cutting plant where they are to be shaped and sanded before shipment for use in lithograph printing.

on Tests of Lithographic Stone of Mitchell County, Iowa" was also published in this volume. This report includes a color plate printed on a sample stone from Mitchell County (see photos on pages 8 and 9).

Clement Webster himself published a journal called *Contributions to Science*, and the June 1915 edition is devoted to "Lithographic Stone at Lithograph City, Iowa," and includes 31 photographs, plates and endorsements from lithographing companies (see page x). Webster recounts that in 1903 the Interstate Investment and Development Company of Charles City submitted samples of stone from its Lithograph City quarries to the Iowa Publishing and Lithographing Company of Davenport, Iowa. This firm reported the stone's quality as equal to the best German stone for high-grade lithography and placed the material on exhibit at the Louisiana Purchase Exposition in St. Louis. These stone products from the Lithograph City quarries were judged in open competition by an international jury and took the gold, silver and bronze medals as well as the Grand Prize Award (see bottom photo on page 11).

The onset of World War I curtailed the importation of Bavarian stone, and the operation at Lithograph City was expanded to meet the anticipated demand for quality stone. By 1915, Webster's community consisted of 15 houses, a hotel, general store, blacksmith shop, lumber yard, stone crushing and polishing plant, dance hall and museum. The quarries operated for only a short period, however, and the town failed to prosper as metal engraving replace lithographic stone in providing good quality printing at lower cost. After 1915, the town's name was changed to Devonia. A post office was never established, so the town is rarely found on maps or listed with abandoned towns in Iowa. By 1938 it was reported to be completely plowed under.

Today the stone, chemicals, inks and papers of lithography are largely the craft of artists and artisan-printers. In 1960, the Tamarind Lithography Workshop, Inc., was established in Los Angeles under a grant from the Ford Foundation for the purpose of providing a new stimulus to the art of lithography in the United States. In 1968, a representative of Tamarind Workshop visited Iowa to evaluate the potential of using stone from Lithograph City.

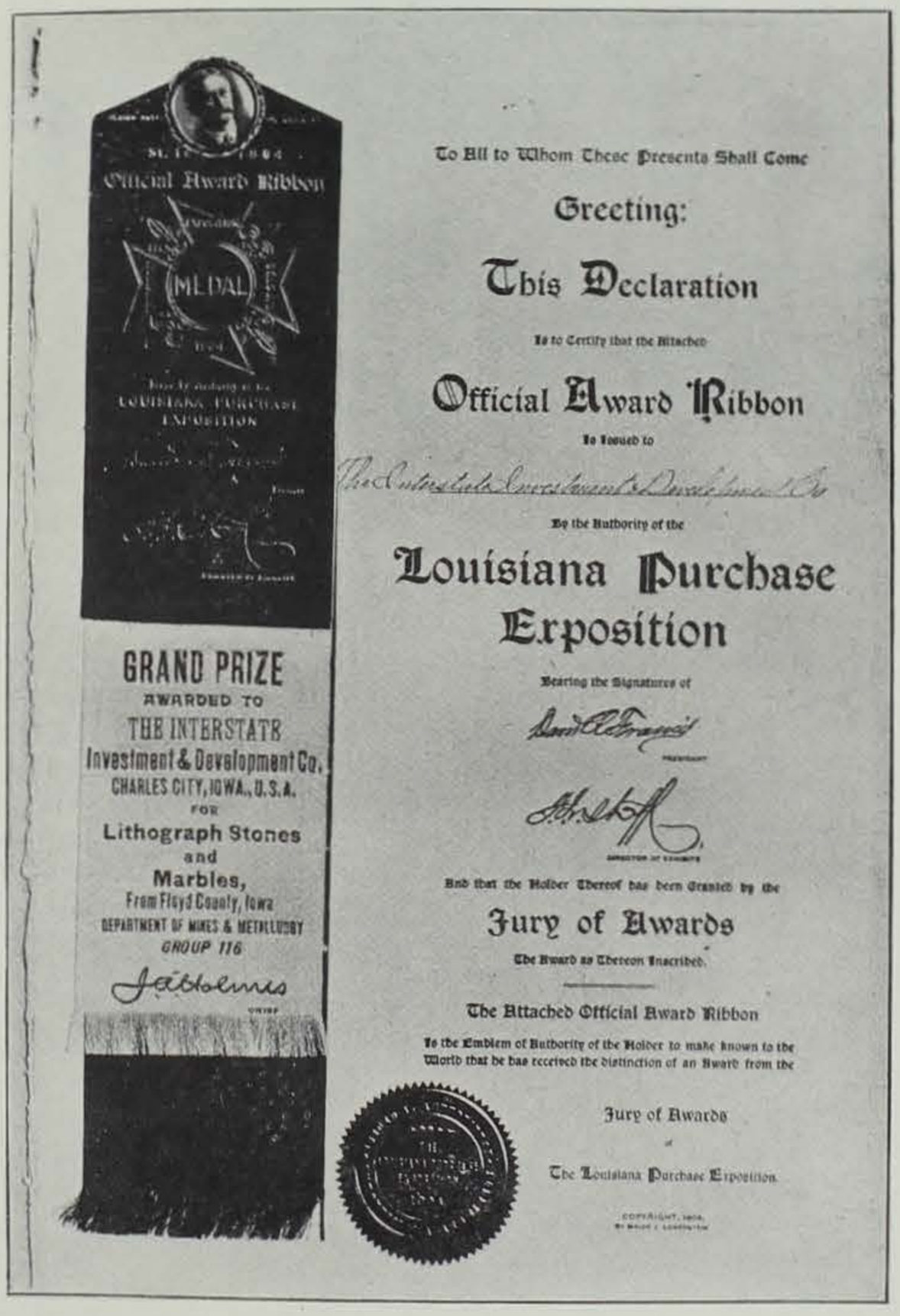
A printing example by the American Lithographic and Printing Company of Des Moines on lithographic limestone quarried at Lithograph City in Floyd County.

Preliminary results indicated that its quality compared very well with Solnhofen stone, as had been determined early in the century. In the course of their studies, however, it was discovered that white onyx could be used as a substitute, and its availability in large quantities and slab sizes for relatively low cost, combined with the cost of reopening the quarries at Lithograph City, essentially removed Iowa from further consideration.

During 1985 and 1986, geologists with the geological survey bureau redefined the stratigraphic framework of Devonian aquifers in Floyd and Mitchell counties, and they recognized widespread, repetitive patterns of lithographic limestones in this part of the state. They gave the name Lithograph City Formation to this distinct sequence of rock (part of the Cedar Valley Group) and established its type-section at the old quarry exposures near the historic site. To date no studies have been undertaken to evaluate the printing characteristics of the additional lithographic stone in Iowa.

Reprint from *Iowa Geology 1991*.

Bill J. Bunker is a geologist for the department's geological survey bureau in IowaCity.



An international panel awarded the Grand Prize to samples of lithographic stone from Iowa during the Louisiana Purchase Exposition in St. Louis in 1904.

A contour map provides anglers

HOW TO

with a picture of what lies below the surface.

READ A

Find out how these lines, circles and points can mean

CONTOUR MAP

a chest full of fish your next time out. by Jim Wahl

The angler was obviously puzzled. "I've never fished this lake. I don't even know where to begin," he said. How often have you thought or heard that statement? I hear it frequently and my usual response is to start with a lake contour map. A bathymetric, or contour, map provides the angler with a picture of what lies beneath the surface.

The contour map is constructed using a recording fathometer or depth sounder. The depth sounder is moved across the lake at a constant speed along straight lines from known shoreline points. The depth measurements along these transects are then plotted to scale within the map of the shoreline. Points of equal depth at established intervals are then connected forming the contour lines.

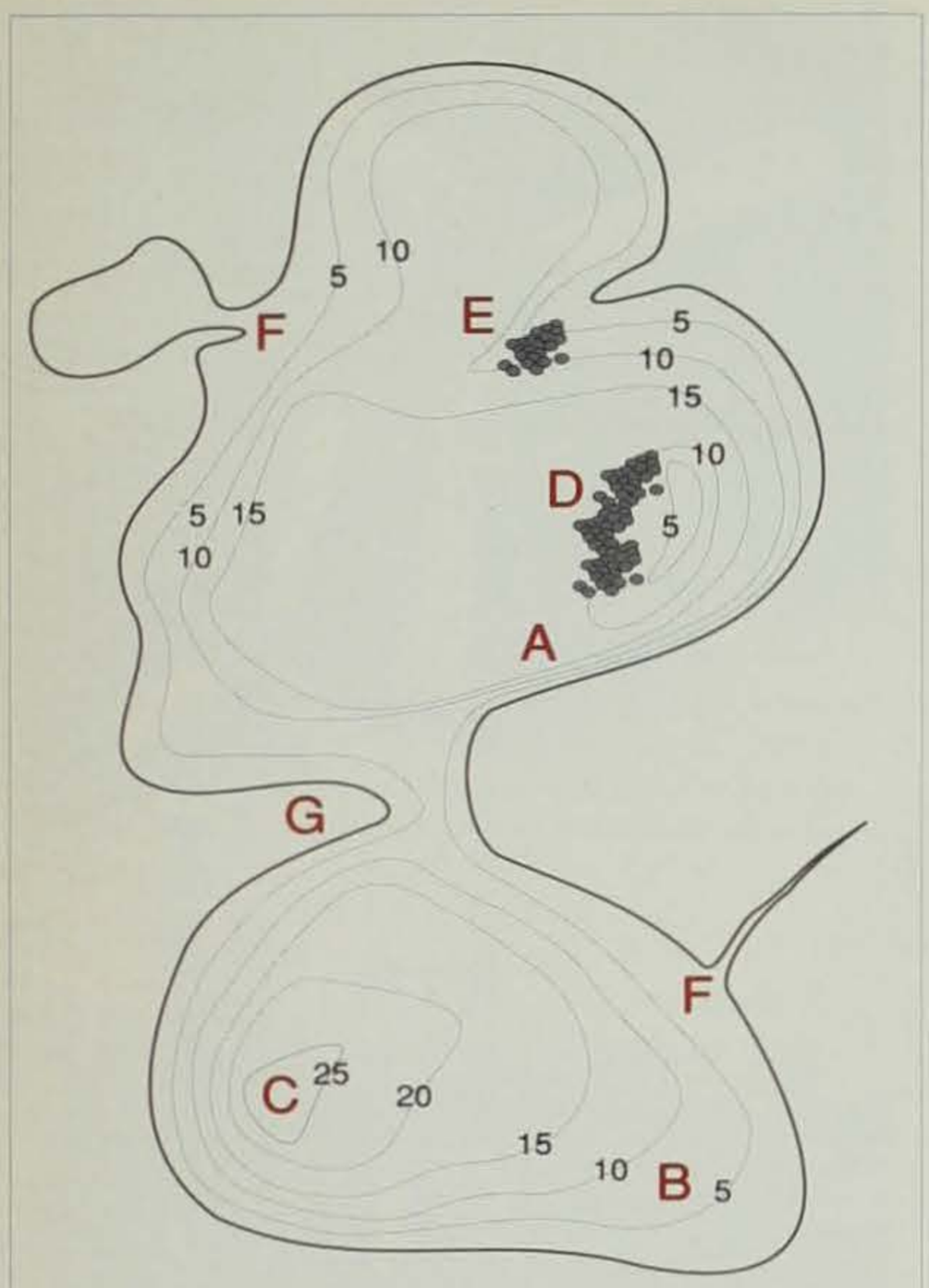
Many maps contain more information than just contour lines. Bottom substrates such as rock or sand areas, as well as boat ramps, public access campgrounds and vegetative cover can also be found on some lake contour maps.

What do the contour lines mean? How do I interpret them so I can catch more fish? To answer these questions let's take a closer look at a lake map. Contour lines that are spaced close together (area A) indicate an abrupt bottom change or steep drop off. Predatory fish such as walleye might find an area like this attractive during midsummer. They can forage in the shallows under low light conditions and quickly move into deeper, protected water as the sun comes up. In contrast, lines that are spaced far apart (area B) reveal a gradually sloping bottom. These areas can concentrate a variety of fish during the spring, especially on the north shore which receives the greatest amount of sunlight. The shallow water warms quickly and provides the warmest water available. Fish in this area will be more active and more likely to be caught.

Area C marks a deep hole, where the maximum depth is in the center. If the lake stratifies, you won't find fish during midsummer in a deep hole, at least not near the bottom. However, if the lake doesn't stratify fish may concentrate within the hole seeking slightly cooler water. Deep holes generally attract fish during the winter months and are good locations to try through the ice.

Sunken islands (area D) are depicted on contour maps by a series of circles with the shallowest depth in the center. In natural lakes these areas may also be referred to as reefs. Reefs generally have rocky substances on top tapering off to gravel or sand on the sides. As a rule, the larger the reef the more fish it will hold. Baitfish can be easily driven off a small reef, but on a big reef, this is less likely. It's not necessary for sunken islands or reefs to have a large vertical rise to be effective, particularly in shallow lakes common to Iowa. A height increase of only one or two feet above the surrounding bottom can be very productive.

Contour maps will also show shoreline features such as points, inlets or narrows. Points (area E) are natural features that are easily recognized and can serve as a reference to help find open-water structures. Fish tend to



A = Abrupt bottom change or steep drop off
B = Gradually sloping bottom
C = Deep hole
D = Sunken islands
E = Natural features
F = Inlets
G = Constrictions or narrows

concentrate near points, particularly if the structure extends out from the point. Points that project a substantial distance from shore have a wide shallow feeding shelf and will attract the most fish. Short-lipped points or long, narrow points are generally not as productive.

Inlets (area F) will frequently concentrate fish. Flowing water entering a lake will attract baitfish which in turn will attract predatory fishes. In natural lakes, inflow often comes through an adjacent marsh. During the spring, shortly after ice-out, northern pike will concentrate in these current areas. Tile drainage into lakes during the summer can be a hotspot. Cool-water fish, which prefer the refuge of cooler water, will often inhabit these areas. Drainage areas may also concentrate catfish seeking food which washes into the lake following a heavy rainfall.

Don't overlook constrictions or narrows (area G). Fish

Lowell Washburn

will move through these areas and the bottleneck will force a high concentration of fish in a small area. If current exists and adequate depth is close by, fish will forage in nearby shallows.

The reference map I used for purposes of this article is a natural lake. Many of the features in it will apply for reservoirs and artificial lakes. In addition to these, look for creek channels and artificial structures such as road beds, houses or flooded timber on reservoir maps.

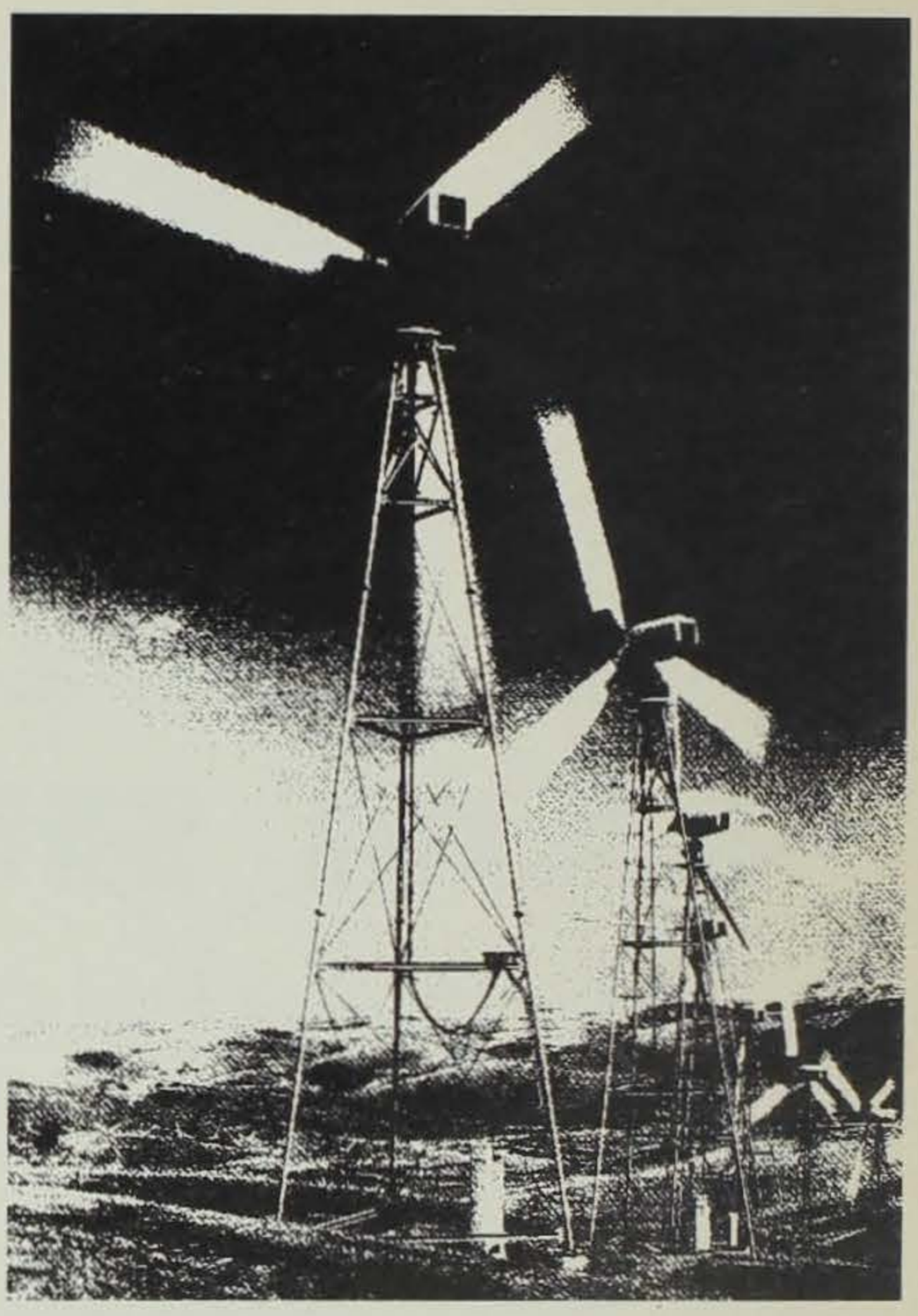
Once you're on the lake, use a depth sounder to help find the exact location of the structure you're looking for. The contour map will get you into the general vicinity, but a depth sounder is essential to zero in on it. After the spot is found establish landmarks on shore to aide in finding it the next time out. Don't be surprised either if you locate structure that isn't recorded on the map. It's easy for mapmakers to miss small structures that lie between established survey lines. Mark these areas down on your map and get landmarks, but don't show anyone except your best friend. I've located a couple of small reefs that weren't on the maps and have had some fabulous fishing. Other boats pass by and look at the map and see nothing but muck. They assume you're fishing for slicks (bullheads). As they pass on by, you breathe a sigh of relief as you slip another walleye into the livewell.

Jim Wahl is a fisheries management biologist for the department at Clear Lake.

by Patricia S. Cale

Energizing The Future

Iowa is no Texas or Wyoming, but can we still make a contribution to the nation's energy future?



Iowa is no Texas. We don't have oil or natural gas. Iowa is no Wyoming. Our coal industry has dwindled to almost nothing. Iowa seemingly doesn't have much to contribute to meeting national energy needs, if we only consider the traditional energy sources.

But Iowa does have something to contribute to national energy policy, and it's something that will mean more for the country's future than all the oil and natural gas and coal. Iowa contributes its understanding that energy efficiency is as much a resource as any new supply of fossil fuels. We contribute our commitment to the development of clean, renewable, "homegrown" energy.

Iowa energy officials are making that contribution through a variety of national task forces, advisory councils and advocacy groups. The following discusses some recent appointments and activities.

USAFREED

A vision of the country freed from dependence on imported fossil fuels drives a new national organization. The United States Association for Renewable Energy and Energy Efficiency Development (USAFREED) had its first meeting in February. Larry Bean, DNR Energy and Geological Resources Division administrator, was elected chair of the board of directors.

According to Bean, the most pressing need in making the U.S. more energy independent is to make new technologies more widely available to consumers. "There are cost-effective energy technologies ready for deployment," he said.

But moving a product from the lab to the store shelves takes money. USAFREED plans to assist by evaluating potential products and then finding venture capitalists to invest in the efforts of energy entrepreneurs who will bring products to the marketplace.

USAFREED has a first-year budget of $4 million. Among the other board members are representatives of the wind and solar industries and energy service companies, as well the states of Montana, Georgia, Pennsylvania and Illinois.

State Energy Advisory Board

A similar role will be played by a new advisory group established by the U.S. Congress for the Department of Energy (DOE). The State Energy Advisory Board was formed to assist the federal government to transfer energy technologies.

According to Bean, "we need to graduate energy technologies" to fill in the gap between research and development and the consumer. The board will advise DOE on selecting projects to fund that will bring new technologies to the market more rapidly.

Another important role of the board is to help the DOE set up incentive programs for state funding. Currently, $20 million is allocated to state energy programs based on population. Next year, an additional $20 million will be available. Those dollars will be used to reward states with more innovative programs. Innovation doesn't necessarily reside only in large states. Forward-looking states, like Iowa, stand to benefit from this program.

Although Iowa has no oil or natural gas -- and almost no coal -- the Hawkeye State can still offer something of substantial value to the energy future of this country -- an understanding that energy efficiency is as much a resource as any fossil fuel.

Great Lakes Regional Biomass Energy Program

States in the Great Lakes region, which includes Iowa, are making a commitment to developing their indigenous energy resources. These efforts are focusing on renewable resources such as solar, wind and biomass.

According to Sharon Tahtinen of the DNR energy bureau, "While each of these resources has potential in the Great Lakes states, the presence of large volumes of wood, agricultural residues and municipal solid waste make biomass a very promising resource for further development." Iowa energy bureau staff serve on the steering committee and the committee's technical advisory group for the regional biomass energy program.

Governors Ethanol Coalition

Iowa is the nation's second largest producer of ethanol. A group of 14 governors has formed to have input into national energy policy on behalf of ethanol. Iowa governor Terry Branstad is a member, and Iowa chairs the group's committee on ethanol policy. Iowa's own policy on ethanol has served as a model for the group's efforts to formulate a national ethanol policy.

The ethanol coalition is playing a part in a new national picture. For the first time, there is national energy legislation putting in place national energy policy. The Governors Ethanol Coalition is ensuring that ethanol will be a choice in the alternative fuels market.

NASEO Board

Iowa also can enhance technology transfer activities through its representation on the board of directors of the National Association of State Energy Officials (NASEO). NASEO is a subsidiary of the National Governors Association, and serves as a conduit of information between national energy labs, where research is done, and the consumer. "The communication must be two-way," Bean said. "There is a gap now between consumer needs and the national research agenda. We can have input into what research is done."

State Energy Programs

Schools and hospitals in Iowa are eligible for federal grants to identify and implement energy improvements under the Institutional Conservation Program. The Iowa DNR administers the program, and discovered several years ago that the federal regulations were too restrictive. The regulations hadn't been changed since 1976. Under the old rules, it would have taken more than 100 years to complete all the improvements needed.

Iowa wanted to make its schools and hospitals energy efficient by 1995 by using the federal funds in conjunction with private financing in its Energy Bank programs. Iowa has almost single-handedly rewritten the federal regulations, restructuring to encourage public-private partnership.

Under the new arrangements, Iowa can do millions of dollars worth of energy work every year, instead of only several hundred thousand. This kind of intense effort is actually a stimulus to economic development because it creates jobs and pumps money into local economies.

Public Buildings Programs

Iowa's programs for energy efficiency in public buildings are making their mark nationally. A goal to eliminate energy waste in Iowa's public buildings has been followed up with concrete programs to achieve that goal. That goal, and those programs, are being copied by both the federal government and other states.

Until Iowa started working on its state buildings, the federal government hadn't done much in federal facilities. With Iowa as a model, the U.S. Department of Energy is now promoting energy efficiency in all federal buildings.

In addition, six other states have adopted aspects of Iowa's buildings programs. Montana, Washington, Missouri, Kansas, Illinois, and most recently, North Carolina, are using Iowa's ideas and adapting them to their own situations.

Recognized as Leader

Besides the DNR's activities, other Iowa agencies are putting Iowa in the lead on energy policy. The energy efficiency programs being initiated by Iowa utilities under the direction of the Iowa Utilities Board, are among the most ambitious in the country. With the new Iowa Energy Center at Iowa State University, Iowa joins only a handful of states with state energy research and development facilities. And the soon-to-be-built Energy and Environmental Education Center at the University of Northern Iowa has the potential to become a national focus for education programs.

Being recognized as a leader in national energy policy will reap direct benefits for Iowa. Those benefits may come in the form of funding to the state, influence over policy and the opportunity to promote Iowa's interests on the national scene.

Iowa isn't a major energy supplier. But it is a supplier of ideas and dedication to Iowa's and the nation's future of energy efficiency and renewable resources.

Reprint from the Iowa Energy Bulletin, *May/June 1992.*

Patricia S. Cale is an information specialist for the department's energy bureau in Des Moines.

LENGTH LIM

Facts and Fallacies

Restrictions on the harvest of sport fish species in Iowa are hardly new ideas. The original laws pertaining to angling were enacted by the Legislature in 1862, scarcely 16 years after Iowa became a state. Those laws established two lines of statutorial development: first, to offer protection of fish and game by limiting hunting and fishing, and second to increase the natural supply of fish and game by making provisions for artificial propagation. By the turn of the 20th century the fish commissioner had established rules that protected the harvest of nearly all fish species through a variety of measures that included minimum length limits, closed seasons, closed fishing seasons during spawning, fish refuges during certain periods of the year, closed seasons during ice cover, along with daily catch and possession limits. Rigid protection of fishery resources was the order of the day, all with the intent that angling success would be preserved and improved far into the future.

In the late 1940s and early 1950s, following the rudimentary start of modern fish management, many of these restrictive measures were rescinded. By and large, most of them failed to achieve the main purpose of improving fishing success and producing larger fish, and it became apparent to most anglers that they were being restricted more than necessary. Information coming from newly formed lakes in the Tennessee Valley Authority, studies of fish population dynamics with a scientific basis, documented over and over that angling was an insignificant factor to the number of fish in a population. Fish populations were widely touted as virtually indestructable by angling, and as a result, fishing restrictions were lifted in most states. Iowa was no different, from a vast array of fishing restrictions a short time before, with the exceptions of rules that you had to possess a license to fish along with some daily catch limits on highly prized species such as walleye, northern pike and the black bass, for the most part, angling restrictions were virtually eliminated.

During the late 1960s and early 1970s anglers again began to express concern about over-harvest because of the meteoric increase in the popularity of angling, particularly for largemouth bass, and the advent of competitive fishing for this species. Angler concerns again focused on the perception that fishing was too good, fish populations were being depleted, and fishing could be improved by simply reinstating catch regulations like those early in the century -- length limits being the most popular suggestion. By the last decade in this century nearly all state agencies had implemented rules that restricted harvest of one kind or another, again with the hope that fishing success would improve and the fish caught by anglers would be bigger.

Iowa was no different -- by this time a statewide minimum length limit was in place for largemouth and smallmouth bass and muskellunge; a minimum length limit on walleye was implemented in the Mississippi River; minimum length limits along with a restricted catch of larger walleye was in place at most of the major natural lakes; and several locations had special regulations that encouraged the development of trophy-sized fisheries -- such as an 18-inch minimum length limit for largemouth bass. Several streams had catch-and-release fisheries for smallmouth bass and trout. Fisheries management via harvest regulations had come full circle, the main difference being that modern-day rules, especially minimum length limits, were more restrictive than ever and they were aimed more at individual waters.

After nearly a century of tinkering with fish populations through length limits and other harvest regulations, the main question that must be answered is -- *Have they effectively achieved the main goal of improving fishing success and producing larger fish for anglers?* The answer is yes *and* no. Although on the surface this question seems quite simple, from a biological standpoint the answer is enormously complex.

Article by Jim Mayhew • Photo by Ron Johnson

IMITS

ies

Length limits are the most popular restriction, but they are not the panacea so widely thought. They are beneficial only if certain conditions exist.

The quality and quantity of aquatic habitats in a body of water are the basic determinants of the potential numerical size of fish populations. Angling, on the other hand, determines the harvest of fish and its impact on the remaining stock and to a greater extent the size structure of fish in the population. The fundamental basis of fish management is, that by regulating the impact of harvest, fish populations can often be manipulated to produce maximum benefits, both in quality size and catch success. Length limits are the most popular restriction, but they are not the panacea so widely thought, and are beneficial to the species of fish that is being regulated only if the three following conditions exist:

- Excessive harvest of all or part of the fish population occurs over an extended period of time;
- Recruitment of young into the population is consistent;
- Growth in length and weight of fish in the population is constant and rapid.

If all of these characteristics are not present, a minimum length limit will not alter the size structure of the population nor create better fishing success. In fact, it will change nothing whatsoever in the biological characteristics of the population, including the size structure and numerical density. Providing the length limit is larger than the average length of fish caught before the restriction, which it inevitably is, the fish caught will be larger than before, because it can be no different.

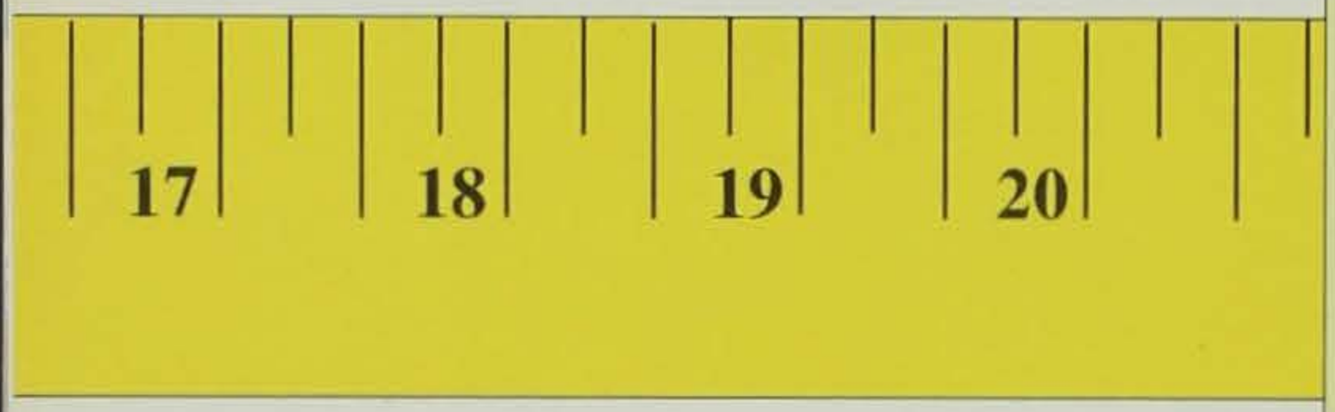
The most obvious condition which suggests that a length limit will be effective is over-exploitation of the species to be protected. For popular sport fish species such as walleye, largemouth bass and smallmouth bass, fish harvest from a population may become biologically excessive if more than 40 percent of the population is removed each year. For a single year or perhaps a few consecutive years, even this rate of mortality may not result in over-fishing, since fish populations possess a remarkable recovery capacity. If this rate of exploitation is not excessive, then restricting the catch of larger fish via a length limit will not produce measurable benefits. Over-exploitation is determined by several techniques commonly used by fish managers. A scarcity of older, and thereby larger, fish in a population is a basic characteristic of excessive mortality, due either to angling or natural causes -- predation or disease. If natural mortality is high, restrictive harvest regulations, such as length limits, will be ineffective.

Consistent recruitment of young fish into the population is vital to the success of minimum length limits. If recruitment is low or variable, benefits from a length limit will be very limited. With few fish to protect, little improvement in angling will be noticed. The most commonly expressed belief is that protecting spawners by a minimum length limit will improve recruitment because more mature fish are present to spawn. For most species of fish, however, no positive relationship has ever been documented between the number of mature fish in a population and recruitment. Environmental factors, such as water temperature, turbidity and weather are far more important.

Growth rate is also an important parameter in the effectiveness of minimum length limits. The most immediate impact of a length limit is that the fastest growing fish in a population are removed first and at the fastest rate. If growth is slow, few fish reach legal size. In some instances, slow

growth results in numerous fish in poor body condition just under the length limit. Biologists use a protected length range or "slot limits" to reduce the density of fish in this size range, which increases the available food supply and accelerates growth of the remaining fish in the population.

One of the most misunderstood concepts of minimum length limits in fishery resource management is that it will always result in larger fish and more fish for anglers. Keep in mind that



with a minimum length limit, fish larger than the minimum remain unprotected. For instance, in the case of the statewide 15-inch minimum length limit on largemouth bass, those fish less than 15 inches are protected, those greater are legal to take by anglers. Thus, the length limit restriction offers no protection to fish greater than the minimum established length. If the exploitation rate is high for these fish, then restricting harvest will alter only the number of fish in the population that are less than the minimum. At that point, growth and recruitment become the important factors in the success of length limit regulations.

Angler compliance with length limit regulations is essential to their success. Despite the fact that an angler caught with an under-sized fish faces court action and a fairly stiff fine, sometimes the temptation overcomes common sense, especially when the rules require someone to release the largest fish they have ever caught. Taking a single, under-sized smallmouth bass may seem inconsequential, and probably is in terms of the total population dynamics, but keep in mind that if all of the thousands of anglers did the same thing, non-compliance with length limits can have profound influences on fishing. There is very little flexibility for non-compliance in minimum length limits.

In the future Iowa anglers can probably expect continued regulation of sport fish harvest with minimum length limits or some innovative and creative alternative schemes. More is being learned about the effects of this sort of restriction each year through rather sophisticated research evaluation. Already an alternative -- protected length ranges -- has been developed to eliminate the fish-density-dependent-slowed-growth problem that often develops in fish populations with minimum length limits. But please bear in mind that length limits are not an easy fix-it-all that comes with guaranteed success at every turn. As Chief Joseph of the Nez Perce once exclaimed while discussing tribal medicine lores, *"Sometimes the magic works, sometimes it does not."*

Jim Mayhew recently retired as chief of the department's fisheries bureau after 37 years with the department.

Current Iowa Length Limits

Black Bass

Public Lakes -- *15-inch minimum length limit* except as otherwise posted.

Federal flood control reservoirs -- *15-inch minimum length limit* on Coralville, Rathbun, Saylorville and Red Rock reservoirs.

Border Rivers -- *14-inch minimum length limit* on the Mississippi River and a *12-inch minimum length limit* on the Missouri and Big Sioux rivers. Associated chutes and backwaters of the border rivers are included where intermittent or constant flow occurs.

Interior Streams and River Impoundments -- *12-inch minimum length limit* EXCEPT all black bass caught from the following stream segments must be immediately released alive:

Middle Raccoon River, Guthrie County, extending downstream from below Lennon Mills dam at Panora as posted to the dam at Redfield.

Maquoketa River, Deleware County, extending downstream from below Lake Delhi Dam as posted to the first county gravel road bridge.

Walleye

A *14-inch minimum length limit* shall apply on walleye in lakes West Okoboji, East Okoboji, Spirit Lake, Upper Gar, Minnewashta and Lower Gar in Dickinson County and Clear Lake in Cerro Gordo County.

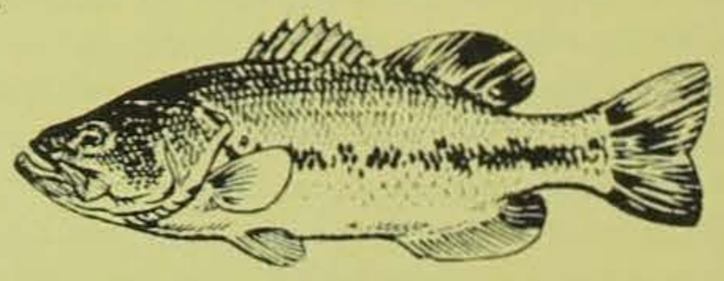
A *15-inch minimum length limit* shall apply on walleye in Storm Lake in Buena Vista County.

No more than one walleye above 20 inches in length may be taken per day from the above lakes except in Clear Lake and Storm Lake where no more than one walleye above 22 inches may be taken per day.

A *15-inch minimum length limit* shall apply on walleye in the Mississippi River.

Muskie and Tiger Muskie

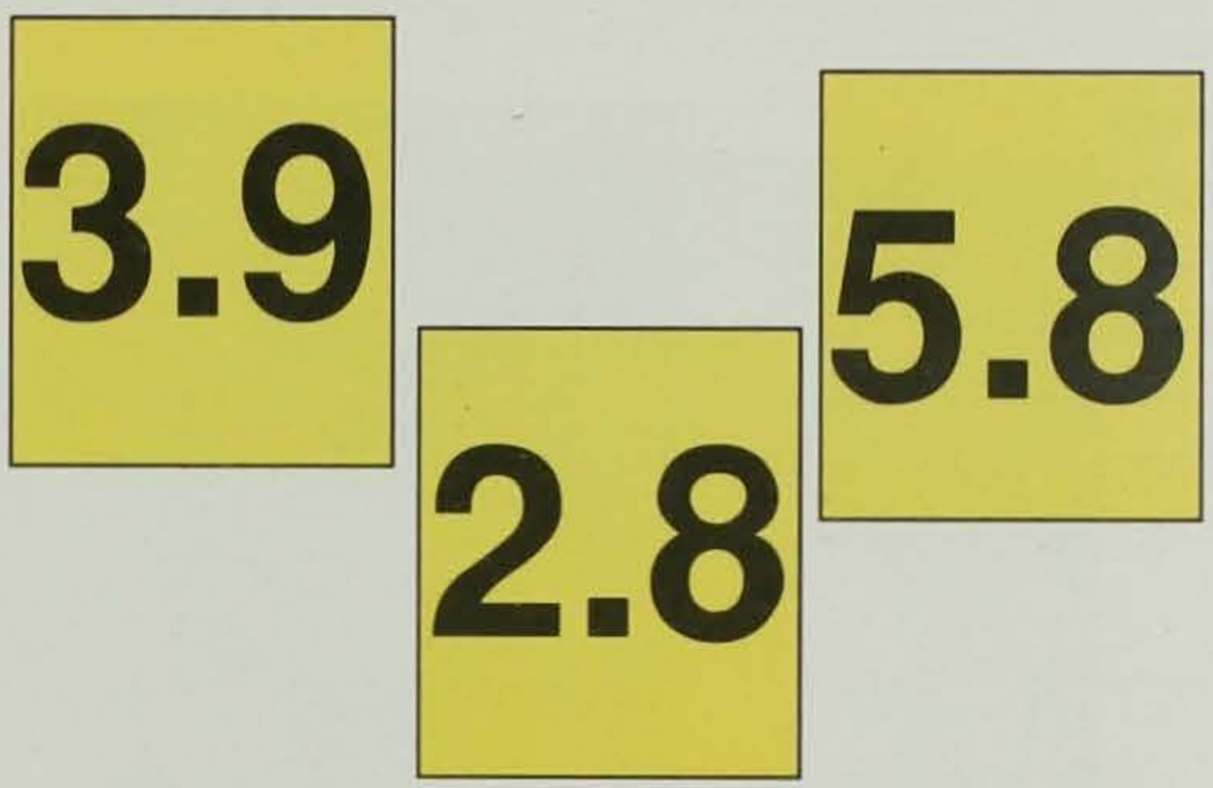
A *36-inch minimum length limit* on all waters of the state.



WARDEN'S DIARY

CHUCK HUMESTON

EXCUSE OLYMPICS



Did you watch the winter Olympics on television? I was obsessed with it. It was one of those few weeks my wife and I seemed to plan our week around the TV.

What particularly amazed me was figure skating. They seem to do it with such gracefulness and so little effort although I know it must take a tremendous amount of dedication and athletic training. I can only identify with it during those rare times they fall.

The scoring system is interesting. You see a similar scale for diving in the summer Olympics. As I understand the system, it's on a scale of 0 to 6, six being high and the athletes are awarded a score based on the difficulty of the routine and its delivery.

People's excuses carry similar routines -- they vary in difficulty and delivery. Recently I 've wondered "what if we carried score cards to hold up?" We could rate stories in these areas but mostly on originality or imagination. I thought back on some past experiences to see if the system would work. Remember, the possible high score is a six.

One day I checked an ice fisherman who told me he had left his license at home. Fine, I told him to mail me his license within five days, wrote him a citation for not showing his license, and told him I would hold the citation for five days.

It came in my mail a couple of days later. I noticed the date of issue was one day before I checked him, but something didn't look quite right. I held the license up to a light and noticed the paper in a circle around the license around the issue date was just a hair more transparent than the rest of the license. So, I called him up and said, "I think you're playing games with me." "Yeah," he answered, "I'm a lab tech at the hospital, and I used something to dissolve the ink and put in a new date. I didn't want my friends to see me get a ticket." Delivery 2.5, Difficulty 5.7, Originality 5.8.

One windy day on the Iowa River Bob Mullen, a fellow officer, watched three people from a parking lot across the river. "Okay," he called me over the radio, "They've been fishing."

I drove down to the three. The first two handed me licenses. As I approached the third, he was removing a sucker from his hook. He looked up shaking his head and said, "Man, you aren't going to believe this." "You're probably right," I answered, "but give it a try." "Well," he said, "I just bought my license today before I came down here. I was standing here looking at it, and the wind blew it out of my hand into the river!" "How unfortunate," I consoled him, "Where did you buy it?" "Oh, just up at that place on Third Avenue, but I just got it, and they probably don't have a record of it sent in yet." "Oh that doesn't matter," I told him, "A carbon is made when they write the license. Let's go look."

He looked at the ground and didn't say anything. "Are we going to keep jumping through hoops and doing a dance, or are you going to tell me the truth?" "I don't have a license, but I thought I'd give this a try," he answered. Delivery 3.9, Difficulty 2.8, Originality 5.8.

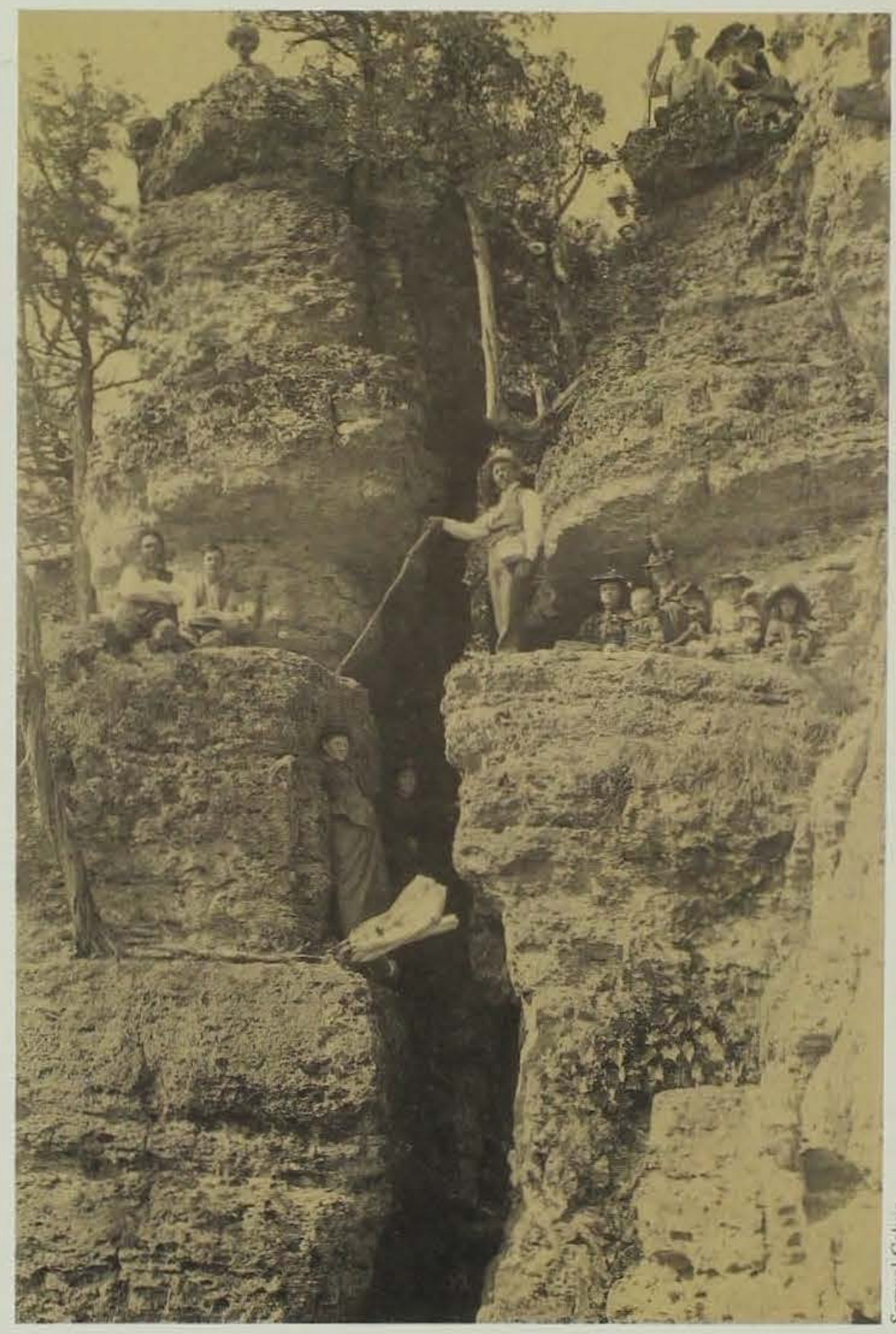
It was a summer day at Spirit Lake as I sat in my car watching a man holding a fishing pole, jigging it periodically. I got out of my car and walked up to him asking to see his license. "I'm just practicing," he said, "I don't have a license, and I don't need one to practice do I?"

"I've heard this before, sir," I said opening the ticket book. He reeled in his line, smiled at me and held up the end of his line which had a large galvanized steel nut on the end of it. No hook, no lure . . . he really was just practicing. I laughed and said, "Yeah, I guess you are practicing." Delivery 6.0, Difficulty (in keeping a straight face) 6.0, Originality 5.8.

You can be the judges for who gets the Gold, Silver or Bronze medals. Keep on training, and we'll keep on rating.

THE GEOLOGICAL SURVEY IN IOWA: 100 Years of Research and Service

by Patricia J. Lohmann



Samuel Calvin

◄ Visual records of early geologic studies in Iowa exist as field sketches, lithographs and a large collection of black and white photographs, many taken by noted state geologist Samuel Calvin. This Calvin photo shows a family field trip in the 1890s. Weathered outcrops of Dolomite at Backbone State Park in northeast Iowa provided a striking geologic setting for this outing.

The centennial observance of the Geological Survey in Iowa provided a special focus for the annual meeting of the North-Central Section of the Geological Society of America (GSA) held April 30 - May 1 in Iowa City. DNR Director Larry Wilson, University of Iowa President Hunter Rawlings, and GSA President E-an Zen were featured speakers at the banquet, and a plaque from the GSA commemorating 100 years of geological research in Iowa was presented to Donald Koch, state geologist and chief of the DNR's geological survey bureau.

The progress of geological research in Iowa has grown remarkably in the past 100 years, mirroring the rapid development of technology, the increased specialization of scientific research, and society's changing needs for geologic and hydrologic information.

In the early years the Geological Survey staff consisted of naturalists and broadly trained scientists who traveled by horseback, bicycle, or horse and wagon around the state examining rock formations, mineral resources, soil and topographic features, archaeological remains and native plants and animals.

The colorfully written annual reports published during this period provided a valuable county by county framework for the extensive research that followed. Studies of surface and groundwater resources were undertaken and a complete listing of existing water wells in Iowa was compiled. Iowa's glacial deposits and bedrock units were also examined and mapped.

By the late 1940s groundwater investigations became the primary focus of the Survey's work as Iowa's economy expanded

to include industry as well as agriculture, and a precise accounting of the state's water resources became essential.

By the 1970s the Geological Survey added aerial photography and satellite images as research tools. This ability has evolved into computer mapping and modeling, allowing different types of information to be merged, providing increased flexibility for present research and in anticipation of future needs.

Investigations into rock, mineral and especially groundwater resources continue to be at the forefront of the state's geologic studies. Iowa has received national recognition for its efforts to resolve groundwater contamination problems through improved agricultural land-management practices.

Over the past 100 years, research in Iowa has been carried out by more specialized geologists, with more information available from increasingly more sophisticated field equipment, research methods and ever-evolving interpretations. As this work continues into the next century Iowans will be provided with the information necessary to further the understanding and wise management of our state's natural resources.

▶ **Julie Kjolhede of the DNR and Victor Boutrous, director, Public Services, of the Advertising Professionals of Des Moines look over materials from the award-winning "Iowa Needs a Cleaner Planet" campaign.**

Ken Formanek

"Iowa Needs A Cleaner Planet" Campaign Honored

An information campaign meant to heighten environmental awareness and improve consumer environmental actions has again been recognized for its quality of production and impact on the public.

"Iowa Needs a Cleaner Planet" was initiated in December 1990 through the combined efforts of The Des Moines Advertising Professionals, The Iowa Newspaper Association, the Iowa Recycling Association and the Iowa Department of Natural Resources.

The DNR was recently awarded the 1992 Golden Circle Award, government division, by the Celebration of the Outdoors, Inc. and The Des Moines Register, for the effort.

Julie Kjolhede, DNR representative on the campaign, said the effort also was awarded first place in the region and third place nationally in the American Advertising Federation's club achievement competition on public service projects.

"Iowa Needs a Cleaner Planet" includes radio spots, print advertisements and an environmental shopping guide. Kjolhede said the Des Moines Ad Pros spent more than 1,500 volunteer hours creating the messages and designs which have appeared in more than 400 free, print ad spaces and nearly 1,000 radio spots on more than 40 stations. The total readership of the market reached by the print ads is more than a million.

Television spots and billboards are also being considered by the campaign founders. The estimated total cash value of the donated media talent and services to date, if purchased, is in excess of $160,000.

Watch for the "Iowa Needs a Cleaner Planet" campaign in your local media.

CONSERVATION
UPDATE

Upcoming NRC, EPC and Preserves Board Meetings

The dates and locations have been set for the following meetings of the Natural Resource Commision, Environmental Protection Commission and the Preserves Advisory Board of the Iowa Department of Natural Resources.

Agendas for these meetings are set approximately 10 days prior to the scheduled date of the meeting.

For additional information, contact the Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa 50319-0034.

Natural Resource Commission:
--July 2, Clinton
--August 6, Lake Mills

Environmental Protection Commission:
--July 20, Des Moines
--August 17, Des Moines

State Preserves Advisory Board:
-- June 9, Mahaska County

New Toll-Free Number Answers Questions on Waste

Recycling and other waste management issues are among the most popular environmental issues with Iowans, prompting the Department of Natural Resources to offer a toll-free number to help meet the public demand for more information. The number is (800)367-1025, and DNR officials stress that it can only be used for waste-related information.

"Waste reduction and recycling are important environmental issues that every Iowan can do something about," stated Teresa Hay, DNR administrator of waste management. "The more information we can provide, the better we can improve the handling of our waste. From school kids to landfill operators, we get thousands of inquiries every year, and I feel this toll-free number will increase our capability to get the best information to people who need it," she said.

Hay also said that persons wanting to call the DNR on issues other than waste management must call the regular number (515)281-5145. To report hazardous waste spills, environmental emergency response can be reached 24 hours a day by calling (515)281-8694. Or, if persons want to report fish and wildlife violations, they can call the toll-free 24-hour-a-day, Turn In Poachers (TIP) hotline, (800)532-2020. The DNR also has a Telecommunications Device for the Deaf (TDD), (515)242-5967.

Farmers Have a New Tool for Animal Management

To help farmers improve their animal waste management, the DNR has published a new, free booklet containing information on the state's requirements for animal feeding operations. *Environmental Regulations and Guidelines for Animal Feeding Operations in Iowa* is available to those interested in waste management of livestock and poultry.

The booklet gives information on rules affecting confinement and open feedlot operations in Iowa. It also provides guidelines for land disposal of waste. These guidelines are important in light of recent awareness of the effects animal waste has on Iowa's water quality.

"The rules and guidelines in the booklet are not new," explained Larry J. Wilson, director of the DNR. "This is an effort to educate livestock and poultry producers on the dos and don'ts involved in waste management," he added.

Wilson said that animal manure is a valuable natural resource. "It provides many of the nutrients needed by crops," he said. "But, if the waste is not properly handled and disposed, it can pollute surface and groundwater. We are trying very hard to provide practical, understandable information on how to comply with environmental protection standards," Wilson added.

The booklet was produced by the DNR with funds through the U.S. Environmental Protection Agency. It is available from DNR field offices, U.S. Soil Conservation Service and ISU Extension Service county offices or by calling the DNR at (515)281-5145.

Remember, there are many ways to reduce waste. Iowa state park's BYOBag program is one of them.

For more information on the BYOBag program contact your local park ranger or call (515)281-5145 for a brochure about the program.

CLASSROOM CORNER

by Barb Gigar, aquatic education coordinator, Springbrook Conservation Education Center

The following activity is a modified version of "Watershed" from the *Project WILD Aquatic* activity manual, copyright 1987.

Age:
Grades 4-12

Objectives:
Students will be able to:
1. describe a watershed; and
2. give examples of how watersheds can be conserved and protected.

Method:
Students measure the area of a small watershed, make a map of it and discuss the roles the watershed plays in human and wildlife habitat.

Background:
A watershed is all the land that contributes runoff (rain, snow, etc., that does not soak into the ground) to a body of water. All plant and animal life in the watershed is dependent on the water found there. People are especially dependent on water. Some experts estimate that each person in the United States uses about 200 gallons of water per day, and about two times that amount is used for agriculture and industrial purposes.

As water runs off the land, it carries soil particles, eroding the land. This is a natural process that has always occurred, but the rate at which erosion occurs can be greatly affected by events in the watershed. For example, farming, construction and mining are all operations that expose soil so that it erodes more quickly. In Iowa, the number one pollutant in our waters is sediment -- soil that had eroded into our rivers and lakes. The economic costs for unwanted sediments in Iowa waters is estimated to be at least $32 million per year.

Other pollutants enter our waters with runoff from the watershed. Nutrients from nitrogen-based fertilizers and pesticides (chemicals used to kill unwanted plants or insects) are two examples. Road salt, oil and gasoline may also wash into streams or lakes.

Water pollution can affect human health, but most often it is wildlife and particularly the aquatic wildlife which suffers most directly from contaminated water. For example, sediment decreases sunlight available to aquatic plants, clogs the gills of small aquatic animals, smothers eggs and reduces the ability of predators who feed by sight to locate food.

A body of water and its watershed are a single unit. What happens in the watershed influences the quality of the body of water. Most scientists agree that it is much more economical to prevent contaminants from entering a water system than to clean up polluted waters.

The purpose of this activity is to introduce students to the concept of a watershed -- encouraging them to explore some ways in which responsible human actions can protect and conserve the environmental quality of watersheds for people and wildlife.

Materials:
Six stakes or markers; hammer; two 50-foot measuring tapes; two 100-foot tapes (or lengths of string marked at one-foot intervals); writing materials; clipboards; worksheet; graph paper.

Procedure:
1. Prior to the activity, select a site that resembles a small watershed, for example a hillside with gullies. The site should be about 100 feet square with enough relief (slope) that students can visualize the watershed concept.

2. Discuss the concept of a watershed. If a farm pond is nearby, you can usually view its entire watershed. Emphasize that there are all sizes of watersheds from tiny tributaries and ponds to large systems like the Mississippi. Illustrate two watersheds joined by a common ridge by placing your hands together, palms up. Introduce the notion of the ridge being the border between two watersheds.

3. Explain to the students that they are going to measure a small watershed, much like larger ones are measured. Show them the equipment and review the instructions in the student worksheet.

4. At the site, have students determine the ridgeline of the watershed and drive five stakes along it at intervals of 20 feet. Then have them decide the location for the control stake at the "bottom" of the watershed. The control stake is the one from which measurements to the other stakes will be made. Have students map the area according to the instructions in the worksheet.

5. Discuss how water drains from the "top" to the "bottom" of the watershed and how anything on the ground can be carried by the water into a lake or stream. Discuss possible pollutants found in the watershed. What are their effects on wildlife? People? What can be done to reduce the pollutants entering the water from the watershed? (See "Resource Materials" below for more information.)

Extensions:
1. Calculate the area of the watershed.
2. Find out the annual precipitation in your area and determine the volume of water that falls on the watershed each year.

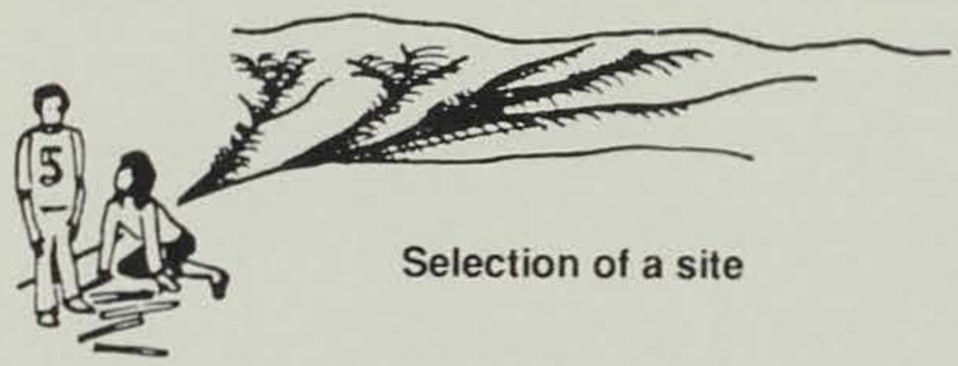
Resource Materials:
Geske, Joel. 1992. Iowa Surface Water Pollution, Iowa Association of Naturalists Publication IAN-102, 20p p.

Watershed: Student Worksheet

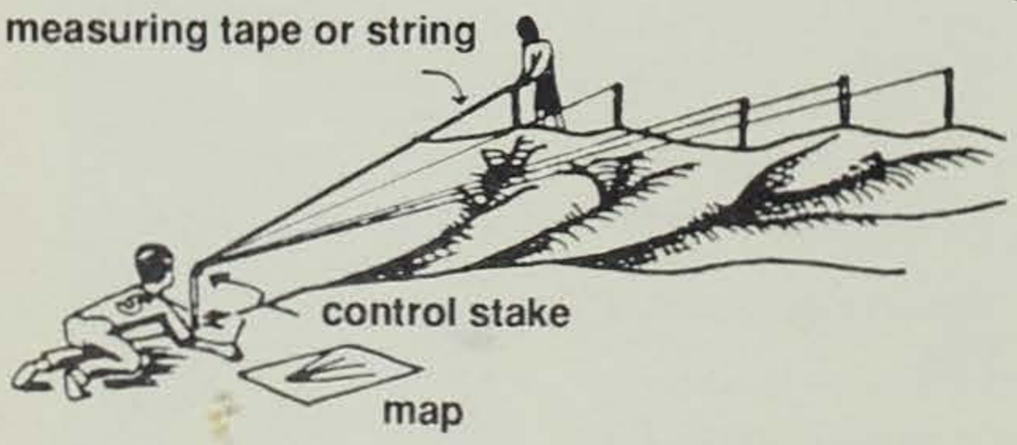
Directions:

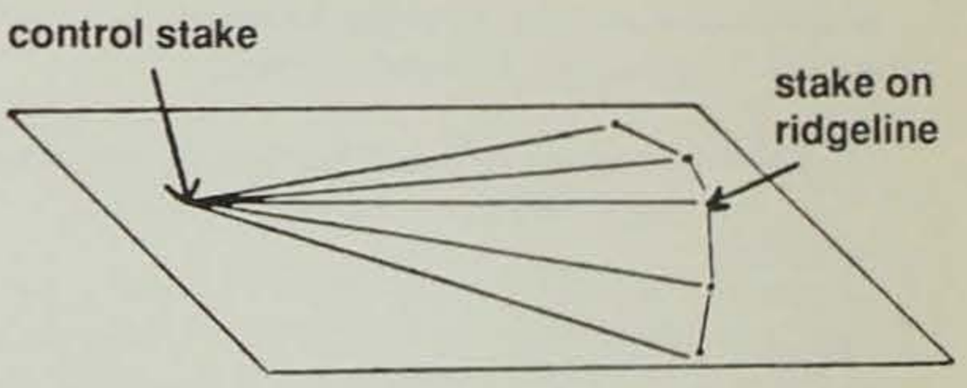
You are going to make a map of a watershed. A watershed is all the land that drains into a body of water. Sometimes it is easy to see the boundaries of a watershed around ponds and small lakes, but the watershed of even a small stream can be many square miles. It is important to know the reach of the watershed of a body of water because land use in the watershed can produce pollution that is carried into the water.

You will need stakes, string or measuring tape, graph paper and something to hammer the stakes into the ground. Find a sloping area. Divide into groups of three or four. Find the ridgeline of your slope. (The ridgeline is the imaginary line that divides two watersheds; for example, the top of a hill.) Drive five stakes along the ridgeline 20 feet apart. Find the "bottom" of the watershed and place your control stake here. (The control stake should be 60 to 100 feet from the stakes on the ridge line.)



Selection of a site





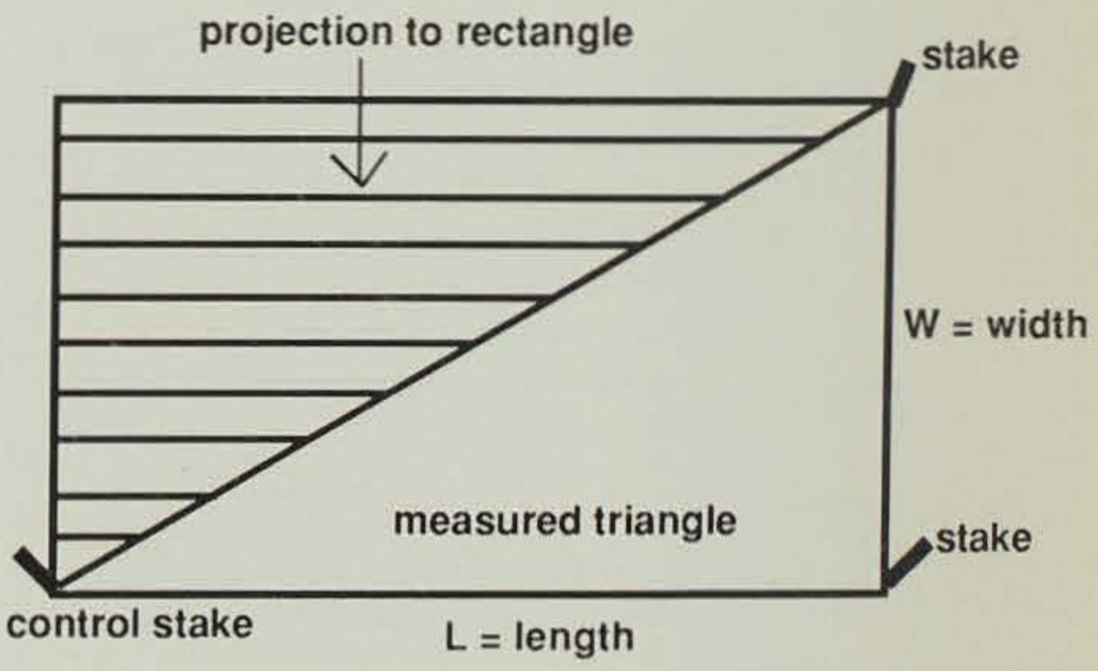
finished map

Plot your control stake on your graph paper along the bottom in the middle of the page. Measure the distance from the control stake to each of the stakes on the ridgeline and plot these lines on your graph paper using the scale (1 square = 5 feet).

Optional:

Determine the area of your watershed.

1. Turn each triangle segment into a rectangle and then determine the area by multiplying length times width.



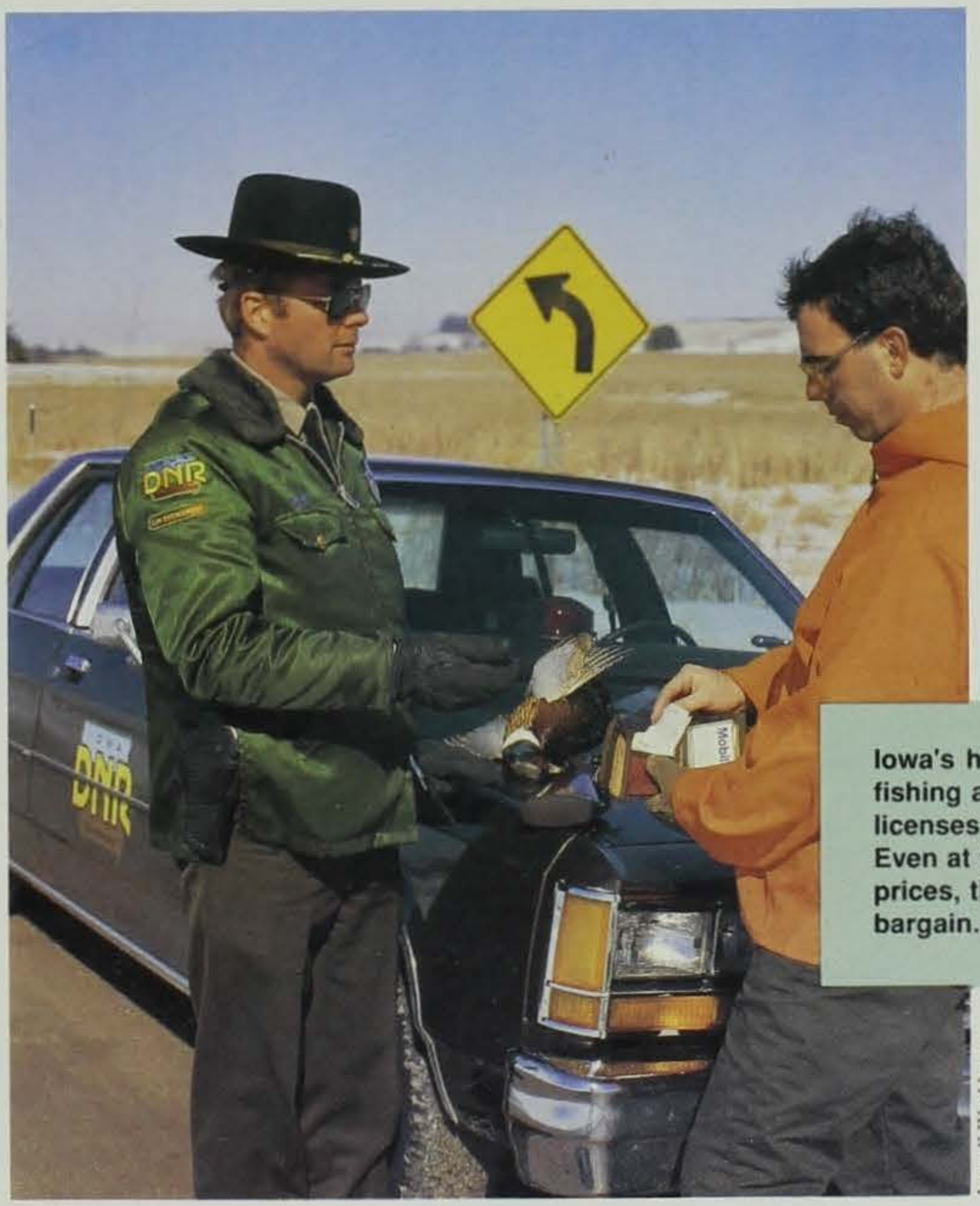
L x W = Area (of a rectangle in square feet)

Divide the answer by 2 since the area of the triangle will be 1/2 the area of the rectangle.

Repeat for each triangle.

2. Add the areas of all four triangles together to find the total area of the watershed.

Still a Bargain



Lowell Washburn

Iowa's hunting, fishing and trapping licenses buy a lot. Even at today's prices, they are still a bargain.

by Richard Bishop

Most hunters and anglers that I know consider their hunting and fishing licenses to be the best bargain that can be found in the state of Iowa. However, during the last nine months since the Legislature passed a bill that raised the price of these licenses, some hunters and anglers are asking why higher fees are needed.

Hunters, trappers and anglers pay for *all* of their own programs. Historically, no general tax dollars are used for wildlife, fisheries or law enforcement programs. Consequently, sportspeople operate on a pay-as-you-go basis. The only exception to this is the Resource Enhancement and Protection (REAP) program where some lottery dollars are used to purchase and develop wildlife habitat. When the Department of Natural Resources adds a new program, additional dollars need to be

Today's hunting, fishing and trapping licenses buy a lot.

generated or other programs must be cut to fund the new ones. These dollars must come from hunting, fishing and fur harvester licenses plus federal funds from excise taxes on hunting and fishing equipment, guns and ammunition. Sportspeople have strongly supported this federal legislation. They have realized they must tax themselves to gain money to enhance their own programs.

Some do not agree that the cost of their outdoor experiences are worth what they receive. Let's take a closer look. An avid Iowa sportsperson might purchase a combination hunting and fishing license, habitat stamp, state and federal duck stamps, a spring and fall turkey license, and hunt deer with both a gun and a bow. The total cost last year would have been $118. Under the new fee structure, it would cost $143. For this expenditure, the individual could hunt all small game, waterfowl, take two deer and two turkeys, and do all the fishing they want. This covers hunting opporuinities from early September through January, and a few days of turkey hunting in the spring plus fishing the entire year. This avid sportsperson might spend 50 days afield a year for a cost of less than $3 per day. The average hunter/angler purchases fewer licenses and might hunt and fish only 20 days, but still the average contribution would not exceed $5 a day. When other forms of recreation are compared to the cost of hunting and fishing, the sportsmen and women of Iowa are receiving a bargain. Those who play tennis and use public courts at no daily cost, must realize all of us pay for those courts, not just those who use them.

License fees are just a small part of the cost of hunting and fishing. Equipment, shotgun shells, fishing lures, food, gas and lodging play a bigger role and benefit the general business economy of the state. At an early age, I learned never to equate the cost of my hunting trips with the meat I put on the table. However, there is an economic benefit to these expenditures in the way of food, especially when it comes to deer. Three meals of venison covers the cost of my license.

All license dollars and federal funds go into the Fish and Game Trust Fund which is the Iowa angler's and hunter's bank account. From this fund, the DNR's Fish and Wildlife Division operates and pays for part of the DNR administration. The Fish and Wildlife Division has management responsibilities for all fish and wildlife, including nongame species, and the enforcement of all fish and wildlife laws and regulations passed by the Legislature and DNR commission. It is impossible to list all the work details and projects that go into successful hunting, fishing and viewing programs; however, here are a few:

The DNR enforcement bureau conducts the hunter education program (all people born after Jan. 1, 1967, must complete the program before purchasing a hunting license). Officers check sportspeople for proper licenses and make sure they are abiding by current laws. They work on reducing the illegal activities of a few people who choose to take more than a legal limit of fish or game, take fish and wildlife out of season or by illegal means, or other illegal activity that might endanger the well-being of any species. They provide educational programs to civic and conservation groups and schools, and conduct wildlife surveys. They respond to calls by the public concerning trespassing, illegal taking of wildlife, and nuisance animals. They also assist with emergencies such as drownings or other accidents.

Fisheries personnel conduct

Lowell Wahsburn

Part of the duties of fish and wildlife law enforcement is to coordinate local hunter education programs.

Current Iowa License Fees

Resident	
Fishing (16 years of age and older)	$ 10.50
7-day Fishing	8.50
Boundary Water Sport Trotline	10.00
Hunting	12.50
Combination Hunting and Fishing	23.50
Fur, Fish and Game	37.50
Lifetime Combination (resident age 65 and older or disabled)	15.50
Lifetime Combination (disabled military veteran or P.O.W.)	30.00
Fur Harvester Licenses	
Age 16 and Older	20.50
Under 16	5.50
Wildlife Habitat Stamp	5.00
Iowa Waterfowl Stamp	5.00
Trout Stamp	10.00
Deer License	25.00
Turkey License	22.00
Nonresident	
Fishing (14 years of age and older)	$ 22.50
7-Day Fishing	8.50
Boundary Water Sport Trotline	20.00
Shooting Preserve Hunting	5.00
Hunting (all ages)	60.50
Fur Harvester	175.50
Wildlife Habitat Stamp	5.00
Iowa Waterfowl Stamp	5.00
Trout Stamp	10.00
Deer License	110.00
Turkey License	55.00

License fees and taxes on sporting equipment pay for the work that goes into successful fish and wildlife programs. Research is a large part of this success. From telemetry studies on pheasants to estimating the fish population of a lake, research, combined with management and law enforcement, create a promising future for fish and wildlife, and those who enjoy it.

Lowell Washburn

Lowell Washburn

Jerry Leonard

research projects and collect information used to improve fishing in farm ponds, streams, lakes and reservoirs. Recent improvements in fishing are a result of construction of high-quality lakes, production of more and improved-quality fish stockings, elimination of fish winterkill in lakes, improvement of habitat in new and existing lakes and a better understanding of the importance of stocking and harvest regulations to angling. Fisheries personnel stock more than one million fish of 15 species, work with landowners and agencies involved in soil conservation to decrease erosion from land above lakes, advise private landowners on proper fish mangement in their farm ponds, build public fishing lakes, provide access to the many streams of the state and information to the public. A new aquatic education program has been developed during the past three years and provides materials to aid school teachers in instructing students about Iowa's aquatic resources and fishing.

Wildlife personnel perform a host of jobs from farming on state lands, to wildlife research, to promoting governmental programs that provide wildlife habitat. The wildlife bureau manages more than 250,000 acres of public land. This requires fencing, erecting signs, leasing cropland to private farmers, planting wildlife food plots, planting upland nesting cover, planting trees and shrubs, controlling noxious weeds, controlling shrub and tree growth in grasslands, creating wetlands, maintaining boat ramps and access roads, and many other land management activities.

Wildlife personnel also work with private landowners to reduce crop depredation by Canada geese and deer. They conduct wildlife surveys, wildlife research projects, analyze research data and make management recommendations, work with the Soil Conservation

Service on erosion control and wildlife practices on private land, talk with landowners who are interested in managing their land for wildlife, and band ducks and geese as part of waterfowl management in the Mississippi Flyway. Wildlife personnel evaluate the Conservation Reserve Program lands for wildlife production, work cooperatively with the U.S. Fish and Wildlife Service on various projects, recommend annual hunting and trapping seasons, trap and transplant wild turkeys, hold public awareness programs, and work with the Army Corps of Engineers in reviewing wetland drainage violations under 404 and 401 of the Clean Water Act.

These cover only a portion of the everyday tasks performed by wildlife, fisheries and law enforcement personnel that translate into hours of recreational opportunities for more than a million people.

Why did we need to raise the cost of licenses? The last raise in hunting and fishing licenses was in 1985 when they increased from $6.50 to $8.50. Since 1985, the cost of boats, outboard motors, cars, trucks, rock for roads, grass seed, farm machinery, fence posts, signs, printing costs of licenses and application forms, and postage . . . and the list goes on and on, have gone up considerably. As these costs go up, those of us paying for these services must either pay more or be willing to accept less.

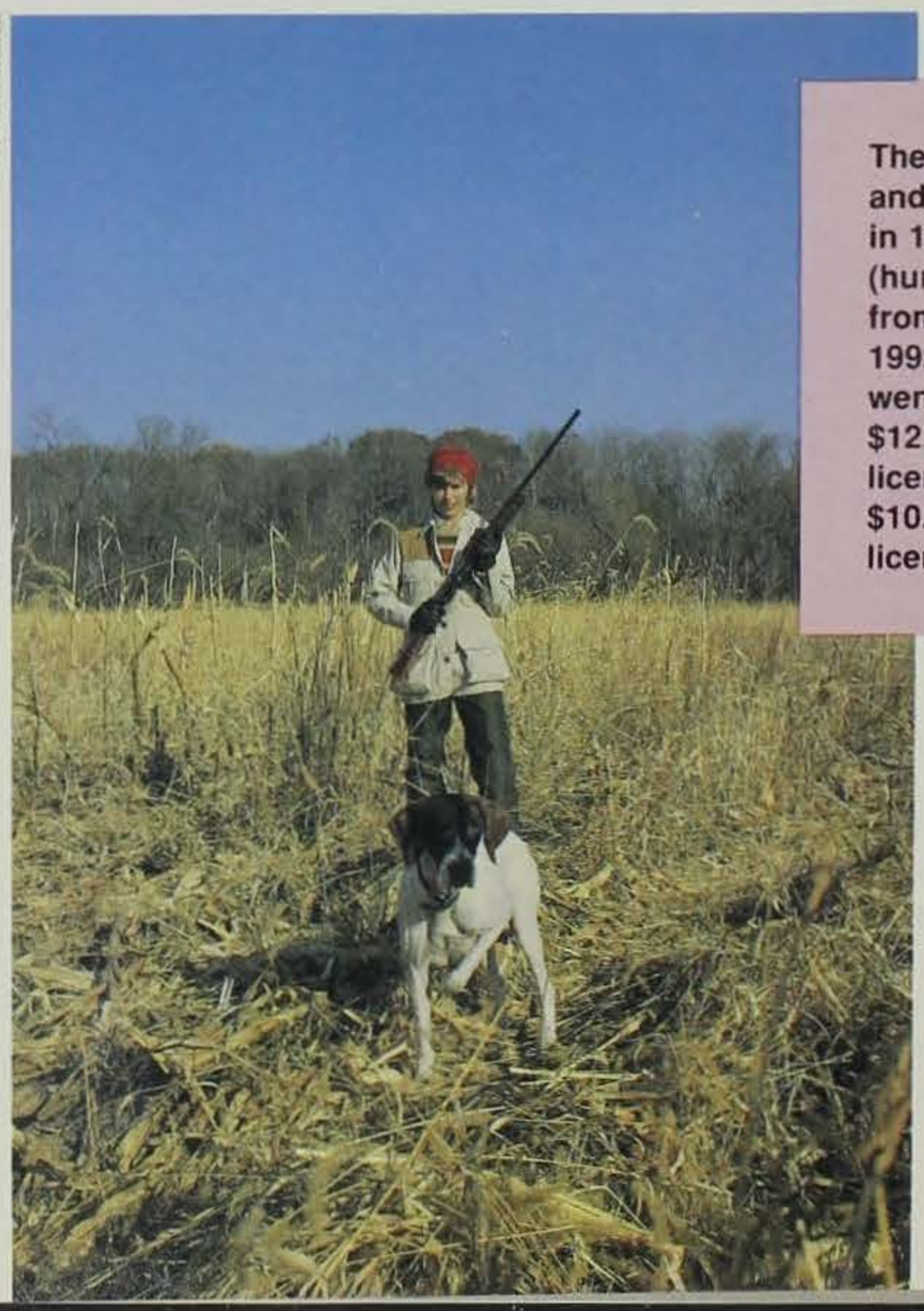
While DNR salaries have moved upward somewhat with the cost of living, they still remain well below comparative positions in private business. For example, the average *starting* salary of engineering students from Iowa State University is equal to the *top* salary of a professional fisheries or wildlife biologist in the DNR.

Without raising license fees, the DNR has a limited operational budget. Consequently, to keep up with the increasing cost of living, salaries consume a larger and larger percentage of the total Fish and Wildlife Division budget. The end result is fewer dollars available to support other program needs. The only way sportspeople can make sure the DNR continues to provide the current level of recreational opportunities is to raise license fees.

The demands by various sporting groups to maintain current programs is strong. Consequently, to maintain what has been happening during the last five years, hunters and anglers realize that license fees must go up. The only alternative is to cut programs like fish stocking, lake improvement, controlled waterfowl hunting programs, assistance

Ron Johnson

Lowell Wahsburn



Ken Formanek

The last raise in hunting and fishing licenses was in 1985 when a license (hunting or fishing) went from $6.50 to $8.50. In 1992, a hunting license went from $8.50 to $12.50 and a fishing license, from $8.50 to $10.50. A trapping license increased $5.

to private landowners, development of wildlife habitat on public lands and the acquistion of hunting and fishing areas.

Many Iowans love the outdoors and its hunting and fishing opportunities. Through good leadership, devoted field personnel and hard-working sportsmen and women, Iowa is purchasing and developing many new wildlife areas for all to enjoy, creating many wetlands, protecting existing woodlands, providing more turkeys, Canada geese, deer, pheasants and nongame, restoring prairie grasslands, improving existing lakes for fishing, building new lakes, and encouraging good land stewardship. The people of Iowa are not willing to give up these opportunities nor can the state afford to have less recreational opportunities for its citizens. People are simply not going to live where quality of life has been neglected.

As long as hunters, trappers, anglers and nongame contributors are required to foot the bill for all the people interested in fish, wildlife and protected habitats, then license fees must increase to pay the bills. Until the time comes when all Iowans are paying a share of the cost to maintain a quality lifestyle, then most of the sportspeople will continue to ask for license increases to pay for these programs — even if it has a high price tag.

My life would not be complete if I could not experience the exuberance of walking through the woods in the springtime with its wildflowers bursting in bloom, the gobble of the wild turkey, morel mushrooms poking through the leaves, calls of migrating warblers, the refreshing smell of springtime or the opportunity to be part of a marsh during fall migration . . . How about you?

Richard Bishop is the wildlife bureau chief for the department in Des Moines.

Ron Johnson

Iowa offers a wide variety of hunting, fishing and trapping opportunities to both residents and nonresidents. Support of recent license fee increases helps to ensure that these opportunities continue.

Lowell Washburn

Lowell Washburn

Roger A. Hill

Shimek State Forest

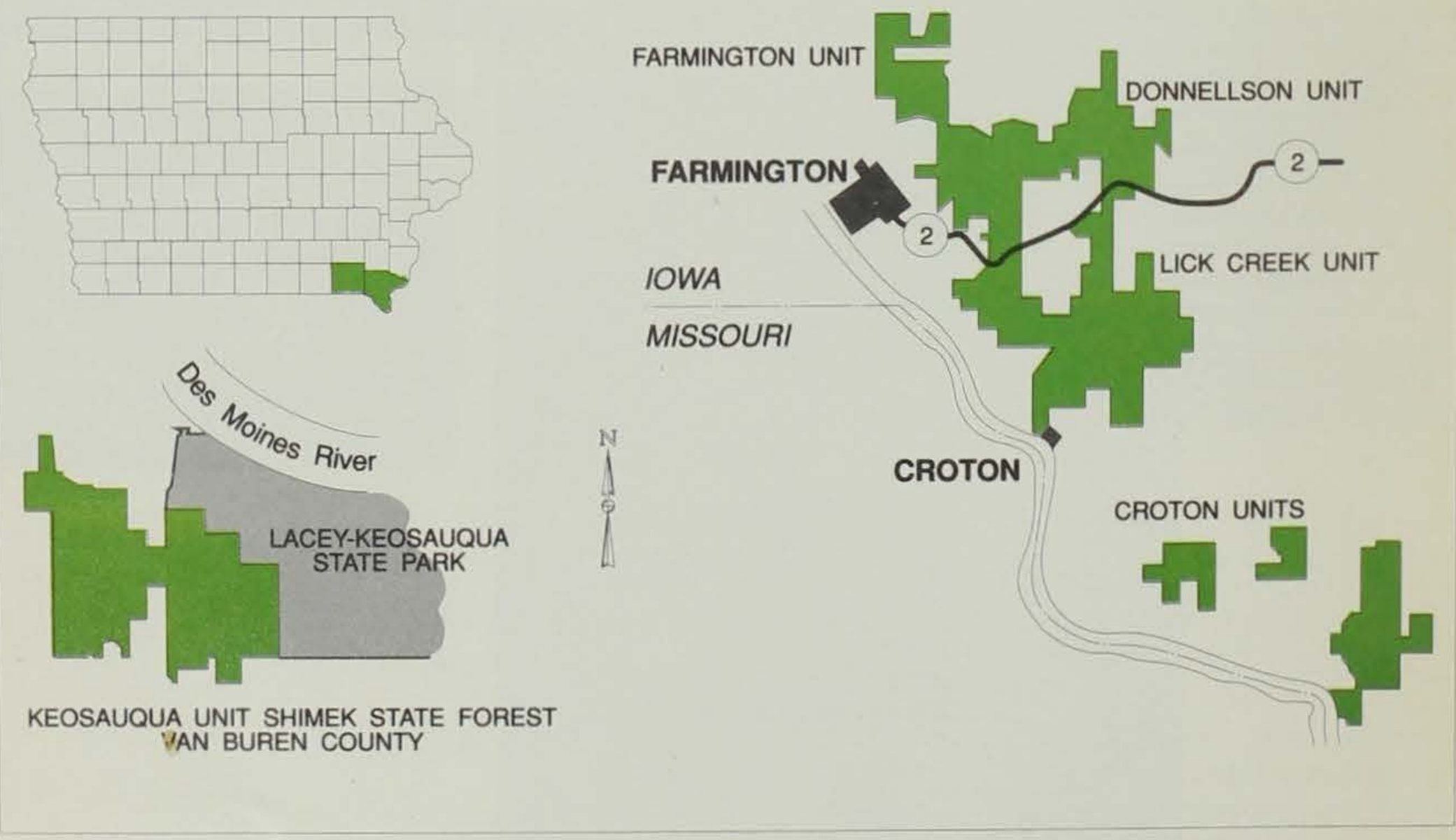
Article by Wayne Fuhlbrugge
Photos by Ron Johnson

One of Iowa's best kept secrets may be Shimek State Forest nestled along the Des Moines River in the far southeast tip of the state. Nearly 9,000 acres of oak and hickory hills and valleys, with more than 1,000 acres of pine plantations interspersed, can afford the visitor a look at a multi-purpose woodland used for timber production, wildlife management and recreational opportunities.

The forest is named after the late Dr. Bohumil Shimek, an Iowa naturalist and former University of Iowa professor. During the 1930s, Shimek convinced the state to acquire vanishing forestland in Lee and Van Buren counties along with abandoned farms, which were depleted from more than a century of farming. Then referred to as the "Lee and Van Buren State Forest," work began to reforest the open areas. The Civilian Conservation Corps planted many acres of hardwood and softwood stands. These northern and southern species were trial demonstrations to determine adaptability to Iowa's climate. The pines that predominate today, Eastern white pine and red pine, have shown that the northern species have faired the best.

Land acquisition continued until pre-World War II days. The name was changed again sometime during the 1940s to the "Farmington State Forest." Through an appropriation by the Iowa General Assembly in 1964, an additional 3,000 acres were added in a purchase from the U.S. Forest Service. These 3,000 acres were part of a larger holding intended to be part of the proposed "Hawkeye National Forest." Reasons are still unclear as to why this national forest was dropped; however, the state forest system benefited greatly. In 1950 Iowa honored the late Dr. Bohumil Shimek by naming the largest contiguous stand of state-owned forest after him.

Forestry demonstrations within Shimek include various plantings, thinnings and harvests with the empha-



▲
Nestled along the Des Moines River in southeast Iowa, Shimek offers visitors a wide variety of outdoor activities. More than 20 miles of equestrian trails are available and the annual Forest Crafts Festival is held each October at nearby Lacey-Keosauqua State Park.

sis on sustained yield management for the dominant white and red oaks, used for veneer and sawlogs. Through private contractors, timberstand improvement or thinnings have been done for pulpwood, firewood and Shiitake mushroom logs. During the last two years, experiments through demonstration thinnings have been conducted to produce "Iowa-grown" softwood products from the many acres of pines. Possible uses for landscape timbers, highway sign posts, log cabin logs and other products, which are currently "imported" to Iowa, are being marketed. The establishment of a new market for forestry products with the wholesale industry can be linked to the cooperation of the Iowa Wood Industries Association. This will have significant implications for expansion of the wood industry in Iowa and insure management production on more forested acres.

Because Shimek, as well as other state forests, are considered public hunting areas, hunters may find excellent wild turkey and white-tailed deer hunting in season. Resident and non-resident hunters can also enjoy squirrel, rabbit, quail and many other species of small game in season. Fishing any time of the year in one of the many small lakes in the area could yield a limit of largemouth bass, channel catfish or several types of panfish. Only electric trolling motors are allowed on the ponds and small lakes.

The cool sandy woodlands also provide opportunities for primitive camping at one of four campgrounds at $4 per unit per night. Two of these, located in the Lick Creek Unit, are designed for use by the equestrian camper, with more than 20 miles of specially marked horse trails available.

Scenic hiking trails honeycomb the remaining Croton, Donnellson, Farmington and Keosauqua units. Picnicking, nature study, fishing, hunting, cross-country skiing, snowmobiling, bicycling, mushroom hunting, hiking and horseback riding are all available at Shimek.

Forestry field days that address forestry issues for private landowners are held each September. Spring and fall nature walks and outdoor days for students attract more than 2,000 individuals annually. And, the very successful Forest Crafts Festival, held at nearby Lacey-Keosauqua State Park in October, is another major forestry event. For information on these events, contact the area forester at Shimek State Forest, Farmington, Iowa 52626, (319) 878-3811.

Wayne Fuhlbrugge is the area forester at Shimek State Forest.